BBC MICRO·MASTER·ELECTRON·ATOM

£1·25

# ACORN USER

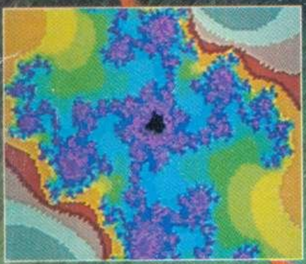
MAY 1986



**TAPE TO DISC:**
Sorting out the problems

**WORDPROCESSING:**
Avoid mistakes with our advice

**ROM/RAM BOARDS:**
We answer all your questions



**MANDELBROT SET:**
Colour displays for BBC/Electron

**REVIEWS:**
Fleet St Editor, Wordwise aids

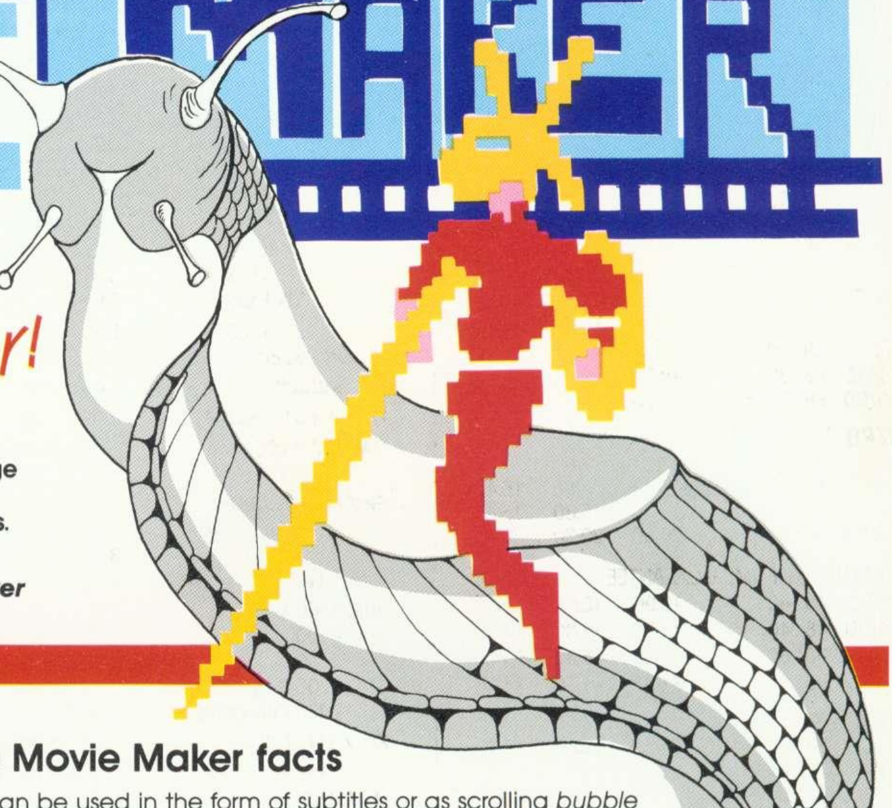
EDUCATION EXTRA

## SATELLITE STATION FOR SCHOOLS

PLUS: 7-page guide to software
AND: Micros as tools

# MOVIE MAKER

*Become a Movie Director!*



With the new **Movie Maker** software package from *Slippery Slug* **ANY** user can create impressive animated films or graphics displays.

Don't miss out on this exciting new medium and your chance to win the ***Micro Movie Maker of 1986*** award (details to be announced).

## SIX SIMPLE STEPS

1. Move the flashing pen around on the screen using the four *arrow* keys.
2. Use it to draw or adjust items of background scenery.
3. Scroll the screen to another position and continue drawing. The area of scenery is unlimited!
4. Use the pen to draw your animated figures. Each one can be up to one quarter screen size
5. Move the figures over your background scenery using the four *arrow* keys. The screen will follow the figure you're currently moving.
6. Now sit back and watch your first movie. **Movie Maker** will playback all of the movements from step 5 above.

## Some Movie Maker facts

Text can be used in the form of subtitles or as scrolling *bubble messages* which appear above the figure that's speaking. There is also a *large text* facility.

The animated figures can also be easily programmed to move arms and legs, change colour or shape in any way, and to grow or lose extra parts of any description.

The teletext graphics system has been used throughout. This enables **Movie Maker** to playback your movies at an incredible speed of 22 frames per second. And also enables a single movie to be over 20 minutes in length.

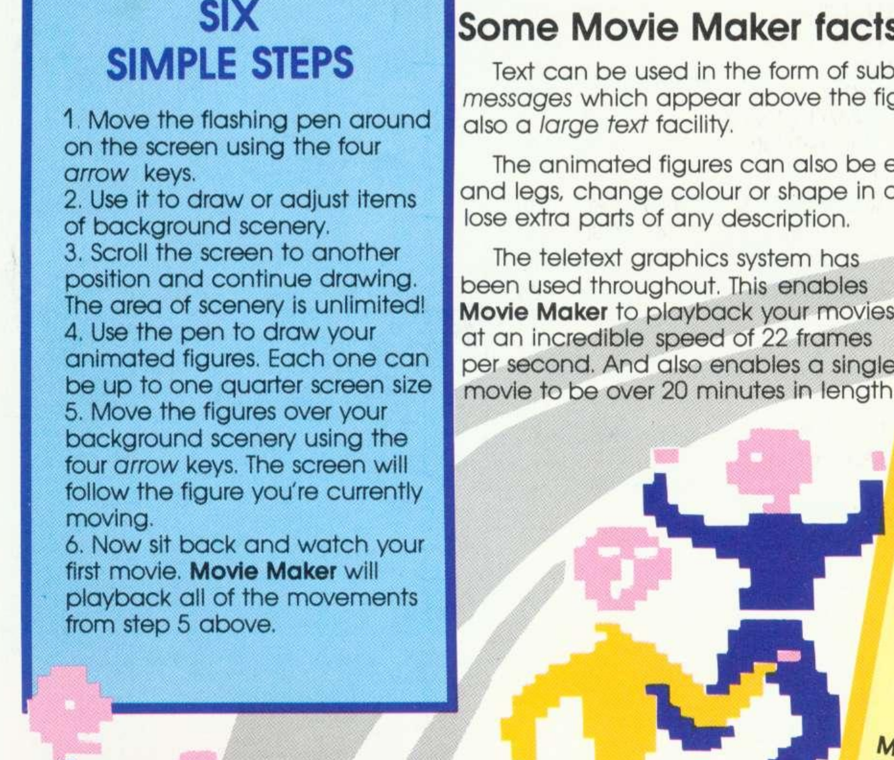
## *The Movie Maker Package*

The package contains two 16K ROMS; USER GUIDE; function key strip; scenery planning map; and a tape containing a 20 minute demo movie, an intro show, and stand-alone playback software (to playback your movies in micros without **Movie Maker** fitted).

Requires a BBC model B micro, tape or disc based. Can be run in sideways RAM.

Mail order price £29.90 fully inclusive.

Or for a detailed description of **Movie Maker's** extensive facilities send £1.95 for the introductory pack (price refundable against purchase) which contains an intro tape and brochure.



TO:

**Slippery Slug,**
**PO Box 83,**
**Bath,**
**BA1 1ZA.**

Tel: 0225 69236

Please rush me the following:
Qty . . . . . . Movie Maker pack(s) at £29.90 each.
Qty . . . . . . Introductory pack(s) at £1.95 each.
Cheque/PO enclosed for £ . . . . . . . . . .
Name . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
Address. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . . . . . . . . Tel. . . . . . . . . . .

# MICRO MEDIA Computer Supplies

**0707 52698 or 0707 50913** Rydal Mount, Baker Street, Potters Bar, Herts EN6 2BP

## UNBRANDED 5¼" DISCS

Lifetime warranty – hub rings – envelopes – labels – write protect tabs.

| PRICES PER BOX OF 10 | TPI | Tracks | 1 Box | 2 Bxs | 3 Bxs |
|---|---|---|---|---|---|
| SS/DD | 48 | 40 | 7.70 | 7.50 | 7.30 |
| DS/DD | 48 | 40 | 9.60 | 9.30 | 9.00 |
| DS/DD | 96 | 80 | 12.50 | 12.30 | 12.00 |
| **3M** LIFETIME GUARANTEE | | | | | |
| SS/DD | 48 | 40 | 12.20 | 12.00 | 11.80 |
| DS/DD | 48 | 40 | 14.80 | 14.60 | 14.40 |
| SS/DD | 96 | 80 | 18.50 | 18.30 | 18.10 |
| DS/DD | 96 | 80 | 18.70 | 18.50 | 18.30 |
| **VERBATIM DATALIFE** | | | | | |
| SS/DD | 48 | 40 | 12.80 | 12.60 | 12.40 |
| DS/DD | 48 | 40 | 15.80 | 15.60 | 15.40 |
| SS/DD | 96 | 80 | 15.80 | 15.60 | 15.40 |
| DS/DD | 96 | 80 | 20.50 | 20.30 | 20.10 |
| **NASHUA** LIFETIME GUARANTEE | | | | | |
| SS/DD | 48 | 40 | 10.90 | 10.70 | 10.50 |
| DS/DD | 48 | 40 | 14.50 | 14.30 | 14.00 |
| SS/DD | 96 | 80 | 15.50 | 15.30 | 15.00 |
| DS/DD | 96 | 80 | 17.90 | 17.70 | 17.50 |
| **CUMANA** | | | | | |
| DS/DD | 96 | 80 | 18.00 | 17.50 | 17.00 |

Packed in library box.

## DISC CARE

| | | | |
|---|---|---|---|
| 5¼" Head Cleaning Disk with 15ml cleaning solution | 5.88 | 5.57 | 5.25 |

## DISC MAILERS

| Price each | 10 | 50 | 100 |
|---|---|---|---|
| Rigid Cardboard holds up to 3 discs | 40p | 30p | 20p |

## COMPUTER LISTING PAPER

All paper plain, fanfold with micro perf edges (except *)

| Size | Weight gsm | Boxed Sheets | Price per box 1 Box | 2 Bxs | 3 Bxs |
|---|---|---|---|---|---|
| 11 x 8½* | 60 | 2000 | 13.50 | 11.82 | 11.00 |
| 11 x 9½ | 60 | 2000 | 13.00 | 12.50 | 11.90 |
| | 60 | 1000 | 7.80 | 7.40 | 6.90 |
| | 80 | 2000 | 16.25 | 14.90 | 14.10 |
| | 80 | 1000 | 9.00 | 8.50 | 8.00 |
| 12 x 9¼ | 60 | 2000 | 15.30 | 13.40 | 12.60 |
| | 60 | 1000 | 8.90 | 8.10 | 7.20 |
| | 80 | 2000 | 18.50 | 15.90 | 15.00 |
| | 80 | 1000 | 10.75 | 9.30 | 8.40 |
| EXACT A4 | 70 | 2000 | 21.50 | 19.00 | 17.70 |
| 11⅔ x 9¼ | 90 | 1000 | 13.70 | 12.00 | 11.00 |
| EXACT A4 suitable for Fixed Tractor Feed | | | | | |
| 11⅔ x 9½ | 80 | 1000 | 16.75 | 14.90 | 13.50 |
| | 100 | 1000 | 29.00 | 27.90 | 26.90 |

## COMPUTER LABELS

| Continuous fanfold sprocket fed labels | Price per 1000 1,000 | 2,000 | 3,000 |
|---|---|---|---|
| 70 x 36 | 5.20 | 4.70 | 4.25 |
| 89 x 36 | 5.80 | 5.30 | 4.80 |
| 89 x 49 | 7.80 | 7.10 | 6.40 |
| 102 x 36 | 6.10 | 5.50 | 5.00 |

Please state no of labels across sheets (1 2 or 3)

LABELS ON 9½" BACKING SHEET FOR FIXED TRACTOR

| | |
|---|---|
| 89 x 36 | 6.60 |
| 89 x 49 | 8.60 |
| 102 x 36 | 6.70 |

Also suitable 70 x 36 3 across

## PRINTER RIBBONS

| Price each per ribbon | 1 | 3+ | 6+ |
|---|---|---|---|
| **ACORN** AP 80 | 3.65 | 3.35 | 3.10 |
| AP100 | 3.65 | 3.35 | 3.10 |
| **BROTHER** HR 5 | 3.00 | 2.80 | 2.50 |
| EP 44 | 2.40 | 2.20 | 2.00 |
| M 1009 | 4.00 | 3.70 | 3.40 |
| HR 15 M/S | 3.90 | 3.60 | 3.30 |
| HR Fabric | 3.90 | 3.60 | 3.30 |
| **CANON** PW 1156A/1080 | 5.40 | 4.90 | 4.50 |
| **CANON** Red Brown Blue | 6.40 | 5.80 | 5.30 |
| **CENTRONICS** G.L.P. | 4.00 | 3.70 | 3.40 |
| **C. ITOH** 8510/8510A | 4.00 | 3.65 | 3.35 |
| **DAISYSTEP** 2000 M/S | 3.45 | 3.10 | 2.80 |
| 2000 Fabric | 4.90 | 4.50 | 4.10 |
| **EPSON** FX/MX/RX 80 | 3.50 | 3.25 | 3.00 |
| Red Blue Brown | 4.60 | 4.25 | 3.85 |
| LX 80 | 3.80 | 3.45 | 3.10 |
| LQ 1500 | 4.75 | 4.40 | 4.00 |
| **JUKI** 6100 Multi-Strike | 2.85 | 2.65 | 2.45 |
| 6100 Single Strike | 1.70 | 1.55 | 1.40 |
| 2200 Fabric | 3.50 | 3.35 | 3.10 |
| 2200 Single Strike | 3.00 | 2.75 | 2.65 |
| 2200 Correctable | 3.30 | 3.05 | 2.80 |
| **KAGA** KP810/910 | 5.40 | 4.90 | 4.50 |
| Red Blue Brown | 6.40 | 5.80 | 5.30 |
| **M/TALLY** MT 80 | 4.55 | 4.20 | 3.85 |
| MT 85 | 6.30 | 5.90 | 5.50 |
| 100/110/120/160 | 5.25 | 4.85 | 4.40 |
| 130/140/180 | 5.30 | 4.95 | 4.60 |
| **NEC** PC 8023 | 4.00 | 3.65 | 3.35 |
| **OKI** MICROLINE 80/82/83 | 1.70 | 1.60 | 1.45 |
| 182 | 9.65 | 9.00 | 8.40 |
| **PANASONIC** KPX 110 | 8.60 | 8.00 | 7.40 |
| **QUENDATA** 2000 MS | 3.45 | 3.10 | 2.80 |
| 2000 Fabric | 4.90 | 4.50 | 4.10 |
| **SEIKOSHA** GP 80 | 3.65 | 3.35 | 3.10 |
| GP 100/250 | 3.65 | 3.35 | 3.10 |
| GP 500 | 4.40 | 4.10 | 3.80 |
| **SHINWA** CP 80 M/S | 4.55 | 4.20 | 3.85 |
| **SILVER REED** EXP500 MS | 4.50 | 4.25 | 3.95 |
| Fabric | 4.10 | 3.80 | 3.50 |
| **SMITH CORONA** | | | |
| EL 1000/2000 M/S | 9.10 | 8.00 | 7.50 |
| Fabric | 3.50 | 3.25 | 3.00 |
| EL1000/2000 Correctable | 5.10 | 4.75 | 4.40 |
| **STAR GEMINI** 10x / 15x | 1.70 | 1.60 | 1.45 |
| **RADIX** 10 | 5.95 | 5.50 | 5.10 |
| **WALTERS** WM 80 M/S | 4.55 | 4.20 | 3.85 |
| WM 80 Fabric | 4.60 | 4.30 | 3.95 |

**If the ribbon you require is not listed ring 0707 52698 and let us quote**

## PRINTER LEAD

Centronics lead to connect BBC Micro to Epson Kaga Canon etc
1 mtr – 6.50
2 mtr – 8.50

**£12.50** MM 100N 5¼ x 100



Anti-static.

Brown smoked Tilt lid with LOCK. High impact cream plastic base, easy access handle for opening and carrying.

**£10.00** MM 70L 5¼ x 70



Black smoked plastic Tilt lid with LOCK. High impact black plastic base. Anti-static.

**£8.50** MM50L 5¼ x 50



Brown smoked Tilt lid with LOCK. High impact cream plastic base, easy access handle for opening and carrying. Anti-static.

**£8.00** MM40L 3½ x 40



Black smoked plastic Tilt lid with LOCK. High impact black plastic base. Anti-static.



Plastic Library Case 5¼ x 10 **£1.60**



Rexel Mini Disc Box 30.

**£5.00** 5¼ x 30 Brown smoked Tilt lid. Cream plastic base

- Large stocks of all products.
- 24-hour despatch.
- Quantity discounts available.
- Educational and HMG orders accepted.
- Trade enquiries.
- Personal callers welcome.

Access — ALL PRICES INCLUSIVE OF POSTAGE & PACKING — VISA

**Please add VAT at 15%**

24-Hour Credit Card Orders **0707 52698**

-MICRO MEDIA-MICRO MEDIA-MICRO MEDIA-MICRO MEDIA-

ACORN USER

ISSUE No 46 MAY 1986

EDITOR
Tony Quinn

TECHNICAL EDITOR
Bruce Smith

SUB-EDITOR
Julie Carman

PRODUCTION ASSISTANT
Kitty Milne

EDITORIAL SECRETARY
Deborah Henderson

TECHNICAL ASSISTANT
David Acton

ART DIRECTOR
Mike Lackersteen

ART EDITOR
Liz Thompson

ART ASSISTANT
Simon Carter

GROUP ADVERTISEMENT DIRECTOR
Nicci George

ADVERTISEMENT MANAGER
Simon Goode

SALES EXECUTIVE
Jonathan Rawlins

MERCHANDISING MANAGER
Sarah Bullard

SUBSCRIPTIONS MANAGER
Kate Evans

PUBLISHING DIRECTOR
Michael Potter

EDITORIAL DIRECTOR
Christopher Ward

## NEW USERS



## REVIEWS



## EDUCATION



## BUSINESS



## REGULARS

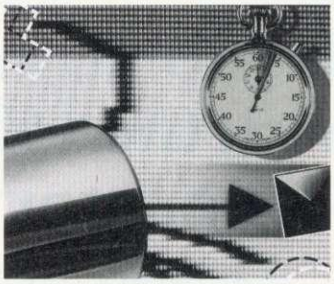


Subscriptions: UK £17.50; Europe £25; Middle East, Americas, Africa £30; rest of the world £35 (prices include p&p for 12 issues). Published by Redwood Publishing Ltd, 141-143 Drury Lane, London WC2B 5TF. Tel: 01-836 2441. Printed by Watmoughs Ltd, Bradford. Typesetting and colour reproduction by Publishers Reprographic Services, London. Print production by Aquarius Print and Design, London. Distributed to the news trade by Comag, Tavistock Road, West Drayton, Middlesex UB7 7QE.

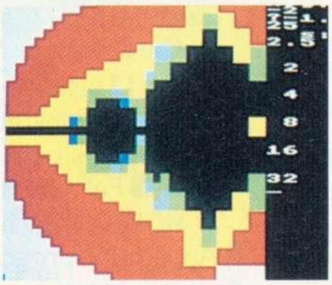
ABC

# FEATURES

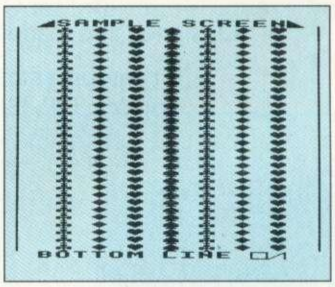




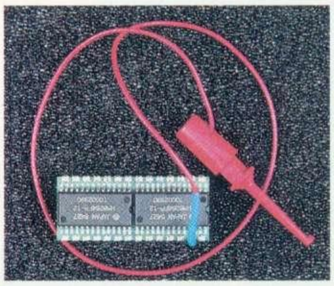




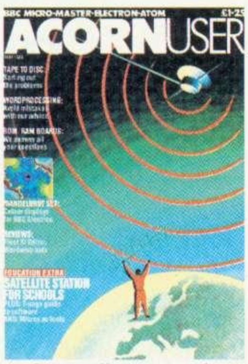




# COVER




Cover illustration by Paul Leith

# NEW ADDRESS

Acorn User has moved offices. Our new address is Redwood Publishing, 141-143 Drury Lane, London WC2B 5TF. The phone number remains 01-836 2441.

# NEXT MONTH

COMMUNICATIONS SPECIAL
Up-to-date information and ideas on communications
Follow your football team with our World Cup database
Communicator reviewed

© Redwood Publishing Ltd 1986. All rights reserved. No part of this publication may be reproduced without prior written permission of the publisher. The publisher cannot accept any responsibility for claims or errors in articles, programs or advertisements published. The opinions expressed are those of the authors and do not necessarily represent those of the publisher, Acorn Computers Ltd or Acornsoft Ltd. Acorn, Acornsoft and the acorn symbol are the registered trademarks of Acorn Computers Ltd and Acornsoft Ltd. ISSN 0263 7456.

# LABORATORY WORKSTATION FOR YOUR COMPUTER

## Professional instrumentation with the 1401 intelligent laboratory interface

**Compatible with the BBC model B, B+ and the new Master range, and all the Acorn second processors.**

- Full 12 bit analogue input and output
- Up to 2 Mbytes of internal memory
- Multi-tasking operation
- Full laboratory software – including FFTs – is included
- Application programs including Spectrum Analyser, Signal Averager, PSTH and INTH.

Designed and made in Cambridge, England

It runs just as fast with the Apple, Apricot, HP, IBM or Nimbus too!




CED

Real-Time Computers

**Science Park, Milton Road, Cambridge CB4 4FE. Tel Cambridge (0223) 316186**

# ROCKFORT

SPECIAL INTRODUCTORY OFFERS ON ROCKFORT DISKS

## TRY US FOR QUALITY, SERVICE AND PRICES

ALL PRICES INC VAT AND CARRIAGE IN UK MAINLAND

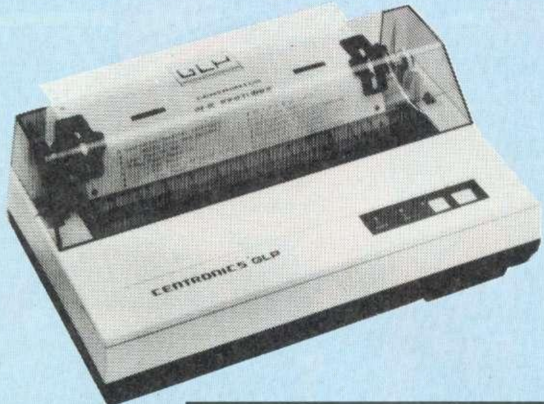
## COMPUTERS

**BBC MASTER 128K**
**£499.00 inc VAT**
**CARRIAGE FREE IN UK**

## PRINTERS

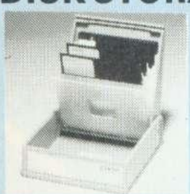
**NEW CENTRONICS DOT MATRIX PRINTER**
**TWICE AS FAST AS THE OLD GLP**

Price: **£220.00**




- 100 cps 10 cpi draft printing
- 25 cps near letter quality
- Cut sheet and fanfold (roll paper and tractors are optional)
- Original plus 2 copies
- Bidirectional logic seeking
- 48 international characters
- Subscripts, superscripts and underlining
- IBM PC block and high resolution pin-addressable graphics

## DISK STORAGE

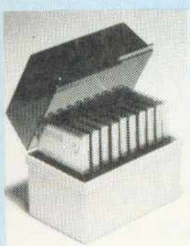


**M.F. 10 Floppy Disk Box**
Holds 10 - 5¼″ Disks
**£2.75**

**REG. DESIGN**



**M.F. 50 Floppy Disk Box**
Holds 50 - 5¼″ Disks
**£9.50**



**M.D. 12/30 Micro Disk Box**
Holds 12 to 30 - 3½″ Disc according to thickness
**£7.85**

## BROTHER PRINTERS

| MODEL | DESCRIPTION | |
|---|---|---|
| M1109 | Dual Interface with T/F | **£231.00** |
| HR10 | Dual Interface – Daisywheel Printer | **£304.75** |
| EP44 | Teleprinter | **£233.00** |
| TC600 | Teleprocesssor | **£420.00** |

## ROCKFORT LABEL 5¼ FLOPPY DISKS

| | |
|---|---|
| **10-SS/DD 48tpi** in MF 10 box | **£13.80** |
| **10-DS/DD 48tpi** in MF 10 box | **£15.80** |
| **10-SS/DD 96tpi** in MF 10 box | **£21.55** |
| **25-SS/DD 48tpi** in MF 50 box | **£27.80** |
| **25-DS/DD 48tpi** in MF 50 box | **£31.30** |
| **25-SS/DD 96tpi** in MF 50 box | **£41.35** |
| **50-SS/DD 48tpi** in MF 50 box | **£44.00** |
| **50-DS/DD 48tpi** in MF 50 box | **£50.40** |
| **50-SS/DD 96tpi** in MF 50 box | **£68.80** |

## PRINTER RIBBONS

| TYPE | |
|---|---|
| Epson MX100/FX100 | **£8.50** |
| Epson MX80/FX80 | **£5.20** |
| Seikosha GP80 | **£5.20** |
| Seikosha GP100 | **£5.70** |
| Seikosha GP250 | **£6.85** |
| Brother HR15 M/S | **£6.90** |
| Brother HR15 Carbon | **£4.80** |
| Juki 6100 | **£3.45** |
| IBM 82 (High yield) | **£3.80** |
| OKI 80/82 | **£3.80** |

## ROCKFORT LABEL DISKS FEATURE:

- Write protect notch
- Hub rings
- Individual sleeves
- Full set of labels

and are fully GUARANTEED. We are confident that you will be delighted with our disks, but in the event you are not we will exchange the disks or refund your money – the choice is yours!

## HOW TO ORDER

We accept orders from all HMG, schools, universities, libraries, etc when accompanied by an official purchase order.

All other orders must be sent with a cheque or PO for the appropriate amount.

If you wish to use Access/Visa card then call us on 01-203 0191.

You can save on P&P by calling in at our showroom in Hendon.

## LISTING PAPER

| | | |
|---|---|---|
| 60 grams micro perf 11″ x 9½″ | 1000 | **£9.00** |
| | 2000 | **£15.00** |

## ROCKFORT PRODUCTS

**81 Church Road, Hendon, London NW4 4DP**

**TEL 01-203 0191**

**YOU ARE WELCOME TO VISIT OUR SHOWROOM**

**TRADE ENQUIRIES INVITED**

# THE ULTIMATE UTILITY FOR THE BBC MICRO

# SPEECH!




**A**T last, speech synthesis at a price you can afford. SPEECH! works entirely in software, taking up only 7K of RAM: no hardware whatsoever is required. Unlike other systems, SPEECH! has an unlimited vocabulary: it will say anything you want it to, and is simplicity itself to use. Simply type in: ***SAY I am a talking computer, as easy to use as 1 2 3**... and the computer speaks.

Adding a question mark to the end of a word pushes the pitch up (*SAY How are you?) and a full stop pushes it down (*SAY I am really unhappy.) You can even change the overall pitch by using the "*PITCH" command.

SPEECH! has a built-in parser which translates English words into 'phonemes' or speech particles. There are 45 different phonemes, and 8 different pitch settings for vowel sounds. These phonemes can be used directly by using the "*SPEAK" command (e.g. *SPEAK HEH4LOW4), so stress or intonation can easily be added wherever desired. You can even say foreign languages.

Hear SPEECH! for yourself in the loader programs of REPTON 2 and CITADEL.

Every copy of SPEECH! comes complete with 5 programs:

| | |
|---|---|
| SPEECH! | — the 7K program |
| DEMO | — shows off all the features |
| SPELL | — a simple educational program |
| SAYFILE | — says WORDWISE, VIEW files etc. |
| RELOCATE | — moves SPEECH! around in memory, onto Sideways RAM, etc. |

Applications in:

- games
- business
- education
- utilities

*Previously, to get this quality of speech you would have had to pay at least £30. SPEECH! costs only £9.95 on cassette or £11.95 on disc.*

**SUPERIOR SOFTWARE LTD.**
Dept. AU15, Regent House,
Skinner Lane, Leeds LS7 1AX.
Tel: 0532 459453.

**OUR GUARANTEE**

- All mail orders are despatched within 24 hours by first-class post.
- Postage and packing is free.
- Faulty cassettes and discs will be replaced immediately.

Access
VISA

**WE PAY UP TO 20% ROYALTIES FOR HIGH QUALITY PROGRAMS**

# NEWS

## News in brief

● Incentive's *Moon Cresta* game offers the chance to win one of the original arcade machines. It runs on the Beeb and Electron at £7.95 on cassette and £2 extra on disc.

On the adventure front, Robico has released *Project Thesius*, a text-only follow-up to *Enthar Seven*. Electron and BBC B cassettes cost £9.95, with Beeb discs £11.95.

Also, the *Midge* text compression system used for the game is available on BBC disc for £11.95.

● Computer Concepts has cut the price of *Wordwise* to £36.80. The *Plus* version stays at £56.35. Versions 1.4D of *Wordwise Plus* and *InterSheet* 1.05 onwards work on the B, B+ and Master.

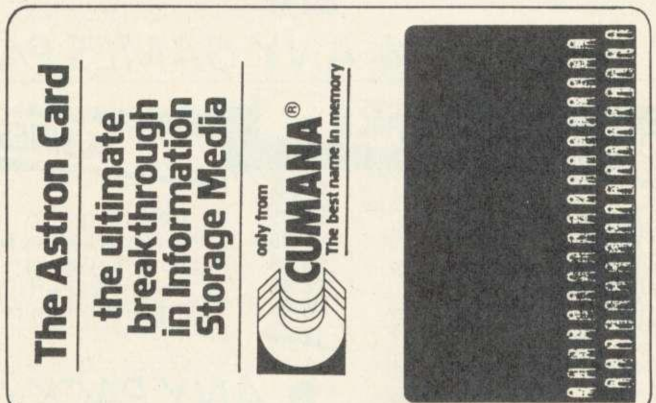
● Tunemaker from March's *Acorn User* was one of the most popular free programs on Micronet. About 1500 people downloaded it. This month's offering is Peter Voke's *Three Dee Shades* program. See Noticeboard for page numbers.

● Opus has upgraded its Challenger combination disc drive system for the BBC micro to 512k of RAM disc from 256k plus a 40/80 track disc drive and double density disc interface. The price remains the same at £249.95. Opus Supplies (0737) 65080.

# The shape of memory to come

Cumana – the company which made its name selling disc drives for BBC micros – has unveiled a revolutionary memory technique: a chip mounted on a credit card.

The Astron card, with inexpensive adaptors, will be in the shops this month, first of all in Dixons with a game for the Commodore 64. Initial products will be equivalent to 16k ROM chips, but RAM and EPROM versions are on the way, as well as a 128k product.




A 16k chip is embedded in this card shown actual size

Price of the card plus interface will be about £24, with the cards themselves costing £5 – expected to come down to around £3 by December. A battery-backed version is under development.

Cumana is distributing the system for Japanese company Astar International under an exclusive European licence. General Instruments is pushing it in the US.

Astar has repackaged conventional chips by surface mounting them on a sheet of plastic. This is already done in Acorn's cartridge software for the Electron and Master but it is the portability of Astar's system which is new.

The first interest in the UK has been from security companies, and the army. The Royal Engineers have been using the cards in the Beeb's serial cartridge slot on the left of the keyboard which is normally covered up.

Cumana's managing director Don Bolton was extremely confident about the new system: 'We see it being very, very big and growing very fast.' He also saw it having revolutionary possibilities for computer hardware, even doing away with traditional RAM and ROM in micros.

The army, he said, was even looking into replacing the conventional 'dog tags' with a card, and the REME had set aside £1 million to develop the system.

At the launch last month Cumana was showing the cards working with BBC micros driving Alfred robots, and Superior Software's *Speech* software. Acorn was there with the Communicator, and talked about the possibilities of putting the card interface on the side of the machine.

Other big names mentioned in connection with the card were Sinclair – which is working on a portable micro called 'Pandora' – and British Telecom.

Acorn has taken one of the 100-or-so development systems that have gone out, although had not had time to design the hardware.

## Olivetti to compete with Acorn in schools

Olivetti has launched an IBM PC compatible micro in competition with Acorn's Master 512 for sale to schools.

The M19 will cost about £1400 and be available in May – three months before the Master 512 priced at around £900. Both machines will go into secondary schools to train pupils in business software – which is where the Olivetti machine has the edge as it has a much higher degree of IBM compatibility.

An Acorn spokesperson explained that it was a historical situation which was unlikely to happen again. In fact Acorn joint founder Hermann Hauser has just signed on with Olivetti as director of advanced research and development.

At the launch of the M19 micro, which uses the 8088 processor running PC-DOS and will run standard IBM software such as *Lotus 123*, Olivetti talked about porting BBC micro educational software on to the machine. However, Acorn was unsure as to its involvement in this. Both companies put a brave face on the prospect of competing with each other. An Olivetti spokesperson told *Acorn User*. 'Obviously there is an overlap, but we'd rather see that than a gap'.

Acorn echoed the sentiment: 'We'd rather sell schools an M19 than see them go out and buy anything else'.

Acorn will 'make the M19 available', and it might well carry an Acorn badge, although a firm decision had yet to be taken.

# ACORNSOFT ELECTRON BONANZA

# AMAZING OFFERS

## GAMES PACKS

### GAMES PACK 1

| | R.R.P. |
|---|---|
| Chess | £6.99 |
| Snapper | £6.99 |
| Free Fall | £6.99 |
| Philosophers Quest | £6.99 |
| Crazy Tracer | £6.99 |
| | ~~£34.95~~ |

### GAMES PACK 2

| | R.R.P. |
|---|---|
| Draughts & Reversi | £6.99 |
| Monsters | £6.99 |
| Starship Command | £6.99 |
| Castle of Riddles | £6.99 |
| Fire Bug | £6.99 |
| | ~~£34.95~~ |

### GAMES PACK 3

| | R.R.P. |
|---|---|
| Boxer | £6.99 |
| Arcadians | £6.99 |
| Planetoid | £6.99 |
| Sphinx | £6.99 |
| Maze | £6.99 |
| | ~~£34.95~~ |

**• ANY GAMES PACK ONLY £8.95**

### HOME INTEREST PACK

| | R.R.P. |
|---|---|
| Talk Back | £6.99 |
| Work Shop | £6.99 |
| Tree of Knowledge | £6.99 |
| Peeko Computer | £6.99 |
| Paul Daniel's Magic Show | £6.99 |
| | ~~£34.95~~ |

### BUSINESS PACK

| | R.R.P. |
|---|---|
| Desk Diary | £6.99 |
| Personal Money Management | £6.99 |
| Business Games | £6.99 |
| Graphs & Charts | £6.99 |
| Creative Graphics | £6.99 |
| | ~~£34.95~~ |

### PRIMARY EDUCATION PACK

| | R.R.P. |
|---|---|
| Sentence Sequencing | £6.99 |
| Word Sequencing | £6.99 |
| Word Hunt | £6.99 |
| Missing Signs | £6.99 |
| Number Balance | £6.99 |
| | ~~£34.95~~ |

**• ANY PACK ONLY £8.95**

## IVAN BERG SOFTWARE

| | R.R.P. | NOW |
|---|---|---|
| Theatre Quiz | £12.95 | £4.95 |
| Crime and Detection Quiz | £12.95 | £4.95 |
| Music Quiz | £12.95 | £4.95 |
| History Quiz | £12.95 | £4.95 |
| Science Fiction Quiz | £12.65 | £4.95 |
| Royal Quiz | £12.65 | £4.95 |
| I Do | £12.65 | £4.95 |
| The Dating Game | £12.65 | £4.95 |

## EDUCATION OFFERS

| | R.R.P. | NOW |
|---|---|---|
| Linkword French | £14.95 | £4.95 |
| Linkword German | £14.95 | £4.95 |
| Linkword Spanish | £14.95 | £4.95 |
| Linkword Italian | £14.95 | £4.95 |
| Maths 'O' Level I | £12.65 | £4.95 |
| Maths 'O' Level II | £12.65 | £4.95 |
| Biology | £12.65 | £4.95 |
| English | £12.65 | £4.95 |

Elite ~~£12.95~~ £11.95
Plus Three Games Disk ~~£19.95~~ £18.95
Magic Mushrooms ~~£11.95~~ £10.95
Me and My Micro Book + Cassette ~~£12.95~~ £4.95
Plus One Games Cartridges ~~£14.95~~ £4.95
STARSHIP COMMAND . . . SNAPPER . . .
COUNTDOWN TO DOOM . . . HOPPER

## FREE

WITH VIEW £29.95 OR VIEW SHEET £29.95

BUSINESS PACK WORTH £34.95 (See above for further details)

PLUS

ELECTRON ADVANCED USER GUIDE WORTH £9.95 (The definitive handbook for serious users)

## CARTRIDGES

Master Compatible

| | R.R.P. | NOW |
|---|---|---|
| LOGO | £59.95 | £39.95 |
| ISO-PASCAL | £59.95 | £39.95 |
| LISP | £29.95 | £9.95 |

## CASSETTES

Master and BBC Micro Compatible

FORTH
LISP
TURTLE GRAPHICS
S PASCAL

ONLY £6.95 each

ORDER ANY 2 FOR ONLY **£10**

CHEQUES PAYABLE TO MICRO POWER. GOODS DESPATCHED WITHIN 48 HRS. PRICES INCLUDE V.A.T. ACCESS/VISA. SEND YOUR ORDER TO: MICRO POWER LTD., NORTHWOOD HOUSE, NORTH STREET, LEEDS LS7 2AA. DEALERS ENQUIRIES WELCOME
TEL: 0532 458800/434006

Name

Address

PLEASE ADD 0.95p P&P

Access VISA

Micro Power Limited, Northwood House, North Street, Leeds LS7 2AA

MICROPOWER




Rats. All excited I was. When the Master was launched they said that the 512 version was based on the Motorola 68000 processor, didn't they? I know I didn't imagine it. Dancing in the streets. Jubilation on a cosmic scale.

However, back at the Acorn Strategic Offence Initiative headquarters, dark plans were afoot to bring the Great British Public back under the yoke. 'Now zat ve haff ze enemy vell and truly drunk, ve go for ze killer blow. Ze next lot of adferts vill announce zat ze processor vill be ze 80186! Ha, Ha.' Same as the IBM PC. Argh! It's like being told that we didn't win at Waterloo after all.

I was at the annual masque ball of the regional chapter of the Ripoff Artists last week. As a guest/observer of course. It was interesting watching these fellows attempting to sell each other life insurance while nicking everything that wasn't nailed down. Discs, ROMs and tapes were moving around the room at flank speed. Similar to 'pass the parcel' except that the passing was involuntary. They seemed to enjoy the dare-devil thrills of sleight of hand more than the programs.

Still, it's not surprising when you consider the state of software. How many more ways are there of simulating the destruction of some poor alien who's probably got a family, mortgage worries and athlete's foot? The greatest innovation is in protection systems. Certainly the shadowy characters at the ball appeared happiest when telling how long it had taken to crack some elaborate piece of code.

I suppose it's like doing crossword puzzles really. I don't like them either.

# Schools' unit has no staff

The new body set up to develop computer education in the UK, the Microelectronics Support Unit, has no director, no staff and no premises. The MSU was due to take over on April 1 from the Microelectronics Education Programme (MEP). Yet by that date the Department of Education (DES) had only appointed a board of 11 advisors and a chairman, Mike Nichol.

Without a director, the MSU cannot implement any policies. Without premises or staff the unit is unable to develop materials or provide practical advice to local education authorities.

*Acorn User* spoke to Mr Nichol just two weeks before his unit was due to take over from the MEP.

He was confident that by the autumn the MSU would be fulfilling the role envisaged by Sir Keith Joseph, the education secretary – a small central support and advisory body. £3 million has been set aside for the MSU in the financial year 1985/6, as against the MEP's £4.5 million in 1984/85.

A former MEP employee said: 'It took the MEP five years to achieve its innovative position. The DES has undone all that work and it could be another five before the MSU is truly functioning in the way Sir Keith Joseph would like.'

## Print-a-T-shirt

Instead of dumping your favourite images onto boring listing paper, why not emblazon them across your chest? Slot a transfer printing ribbon into your Epson FX70 or FX80 and text or graphics screens can be printed on a polyester or cotton T-shirt.

The ribbon costs £12.50 and is available from Banbury Business Computers, 3 Schofields Way, Bloxham, Banbury, Oxon.

## Musical theory

Nebulae Micro Software has produced a music package for the Beeb which teaches the elements of counterpoint theory.

The software costs £22.95 on disc, and versions for Amcom or Econet networks cost £35.

Nebulae Educational Software, Kilroot Park, Carrickfergus, Co Antrim BT38 7DD.

## New Star spotted

The latest addition to the Star range of printers is the NL-10. This dot-matrix printer costs £278, with a parallel interface, and as the name suggests is capable of Near Letter Quality (NLQ) printing at 30 characters per second.

In draft mode, the NL-10 runs at 120 cps. Other features include user-defined characters, an italic font and a headline mode where text is printed at double or quadruple height.

Star Micronics, 40 Uxbridge Road, Ealing, London W5 2BS.



# Econet developed for businesses

Plans are afoot to take Acorn's Econet local area networking system out of its present educational niche and into the fast-growing business world.

SJ Research is developing a range of intelligent Econet interfaces for business machines, including the IBM PC which has half the business market.

Three interfaces are being planned, for each of the major computer connection bus standards, including SCSI, allowing the Apple Macintosh to hook up to Econet; the VME bus, as used on Torch's Triple X range; and the IBM PC bus.

SJ Research is working with Torch, Acorn and several large users of Econet to define 'what can and cannot be done with Econet and business computers', according to Kim Spence-Jones, SJ Research's technical director.

Other Econet suppliers prefer to remain anonymous because, according to Spence-Jones, 'there's still a lot of stigma attached to Econet; a feeling that it is a toy network for schools.'

SJ Research is to release a more sophisticated Econet file server, MDFS, which will cost £1200 and will support four disc drives, a hard disc and a tape back-up.

A top-of-the-range HDFS file server with 80 MByte hard disc, tape back-up and triple processors costs £7200. Other new SJ products include a viewdata simulator for Econet and a menu system.

# WE OFFERED THEM A CHALLENGER-THEY GAVE US BACK A CHAMPION

After testing the new 3 in 1 Challenger disc drive system from Opus Supplies, Britain's three leading BBC micro magazines were clearly impressed. After all Challenger is the fastest disc link-up ever with no complicated interface connections, soldering or track cutting. No wonder this remarkable plug-in disc drive, double-density disc interface and super fast 256K RAM disc combination is currently taking the market by storm.

**A&B COMPUTING**

## THE VERDICT

"Opus have got a winner on their hands. If you are looking for a disc upgrade you can't go far wrong by buying a Challenger, even if you already have a single drive this would certainly be a sensible upgrade path. This certainly gets my vote as best buy of the year."
A & B COMPUTING – JANUARY 1986

## RAM DISC PERFORMANCE

"Here is the pièce de résistance of the whole system – a 256 K RAM disc. I honestly don't know how Opus can do it for the price.

Using the RAM disc is a real dream with disc based applications. Getting back to the actual performance of Spellcheck II, with the dictionary disc set up in the RAM disc, the result is amazing. When in automatic checking mode the text scrolls past so fast it is difficult to read. To put some figures on the improvement in speed, I checked a document just over 21 K long, which took 5 minutes 56 seconds on floppy and only 1 minute 7 seconds using the RAM disc."
A & B COMPUTING

**ACORN USER**

## THE VERDICT

"At £249.95 inclusive you get the RAM disc, double-sided 40/80 track drive, Opus DDOS plus manuals and leads. Overall very good value for money, particularly if you are looking for a disc upgrade from scratch."
ACORN USER – FEBRUARY 1986

## RAM DISC PERFORMANCE

"The big deal comes in the speed. Being a purely electronic device, actions such as reading and writing are performed in fractions of the time a mechanically engineered disc drive takes.

To prove the point, I ran three programs on the RAM disc and the same three on the standard Opus drive with the following results (timings in seconds):

| | RAM DISC | NORMAL |
|---|---|---|
| 1 Save 32 K memory | 0.34 | 13.69 |
| 2 BPUT 1 to 1000 | 1.14 | 4.71 |
| 3 PRINT/1000 strings | 4.64 | 10.17 |

You don't need me to point out the huge speed increases."
ACORN USER

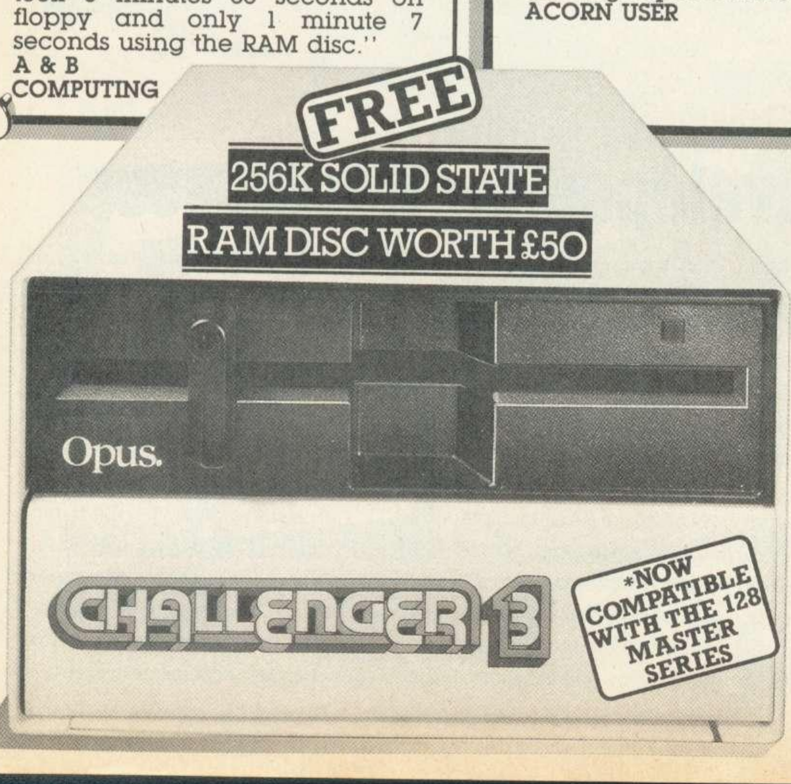
**THE MICRO USER**

## THE VERDICT

"For the serious user Challenger could make file handling far easier and a good sight faster to use than a standard DFS as well as bringing a permanent end to 'is it 40 or 80 track, single or double density?' problems. In addition all the workspace used by a standard DFS is reclaimed and made available to the user by Challenger."
THE MICRO USER – FEBRUARY 1986

## RAM DISC PERFORMANCE

"Of course it's not just a versatile disc drive, Opus also provides you with 256 K of RAM to play with. This RAM thinks it is a disc and the DDOS treats it as drive 4. If you have the 512 K version you get a drive 5 too. The RAM disc allocates sectors to files so that errors such as 'can't extend' are eliminated. In other words, it is a simple matter to use the RAM disc for most of your random access files then copy completed files from the RAM disc to a floppy disc."
THE MICRO USER




Challenger's price of £249.95 includes our unbeatable two-year warranty, a full operating manual, VAT and free delivery.
Call us now on 0737-65080 for details of our nationwide dealer network or simply post the coupon. Generous education and dealer discounts available.

## CHALLENGER-STILL SIMPLY LIGHT YEARS AHEAD OF THE OPPOSITION

To: Opus Supplies Limited, 55 Ormside Way, Holmethorpe Industrial Estate, Redhill, Surrey.
Please rush me the following: (PRICES INCLUDE VAT AND CARRIAGE)

________ Challenger Unit(s) £249.95 each

I enclose a cheque for £________ or please debit my credit card account with the amount of £________

My Access ☐ Visa ☐ no. is: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

NAME ________

ADDRESS ________

TELEPHONE ________

**Opus.**

## Competitions for schools

Schools using the *Music System* composing software can win an Epson RX80 printer or 40-track disc drive.

The System software house is offering four printers as first prizes – and four disc drives for the runners-up – to the composers of the best pieces of music produced using the software.

There are two categories, classical or contemporary, and the pieces must be less than three minutes long.

Closing date is May 12 1986 and further details are available on (0742) 682321.

Another competition has been launched by Michael Jay Publications for users of its *Cellmap* data collection software.

Prizes of educational software worth £160 are on offer to the most creative school projects which use the software. Entry form from MJP on (0795) 534690.

## Beeb control unit

Claydale Electronics has produced a control unit for the Beeb which offers eight opto-isolated inputs and eight relay outputs.

The unit costs £165 plus VAT and up to eight of them can be plugged into the Beeb's 1MHz bus, giving 64 inputs and outputs. One Claydale unit can be powered from the Beeb, but extra ones will require a separate 5V supply.

Claydale Electronics, Unit 1, Bidewell Close, Drayton High Road, Norwich.

## Z80 disassembler

Crossware Products has added a disassembler to its Z80 cross-assembler, which runs on the Beeb, B+ or Master 128. The new utility comes on a ROM and costs £69, and can now disassemble Z80 machine code – stored on disc or in RAM – into the full instruction set of Zilog mnemonics. Crossware Products (0763) 61539.



# School modem scheme on-line

***by Bill Penfold***

The Government has increased new funds for putting a modem in every middle and secondary school by 50 per cent because of the sheer scale of the response to its scheme.

In less than a week after the scheme was unveiled by Information Technology Minister Geoffrey Pattie, more than 5000 schools had snatched up the offer, and the overwhelming majority of these orders are to put school BBC micros on line. Now an astonished but delighted Mr Pattie has increased the original £1 million funding to £1.5 million.

Under the scheme schools have been offered free modems plus software, with the promise of a National Computerised Information Service (NERIS) being established for schools before the end of the year. This will initially cover the curriculum areas of maths, science and geography, with other subjects being added.

Whitehall officials had expected some 9000 to 10,000 schools to take up the offer, but the enthusiastic reaction meant that within days this was revised up to an anticipated 12,000.

The Department of Trade and Industry (DTI) expects that just about every secondary and middle school will have a modem within the next few months.

Two types of modem are being supplied – both of which are already extensively used in some schools – the Tandata 512 and the Dacom DSL 2123AD, normally costing around £200 but which the DTI has bulk-purchased for £110 each.

## From mighty Acorns little Beebs grow

Yes, that's a real £1 coin behind the diminutive BBC micro (left) – monitor, copy of *Acorn User* and user guide are all faithfully reproduced at the same 1:10 scale.

This Lilliputian feat was accomplished by *AU* reader Peter Clements, who has been making models as a hobby for seven years.

The Beeb is cast in resin from a mould, and the master took a painstaking two weeks to carve out of epoxy putty. The mould has also been used to cast Beeb badges *(AU* January).

The monitor lights up, thanks to an internal bulb, but the *Revs* screen is unfortunately static – it's simply a colour transparency of a full-size screen shot.

The user guide and copy of *AU* were reduced photographically and the spiral binding is made from fuse wire.

Acornsoft wanted to buy the mini micro and its puny peripherals but said Peter: 'It was just a one-off and is definitely not for sale'.

## Micro adventures

Children's adventure holiday firm Dolphin is offering BBC micro computing as an option in its multi-activity adventure centres.

Dolphin, Grosvenor Hall, Bolnore Road, Haywards Heath, West Sussex RH16 4BX.

## Graduate's Soft Option

Torch Graduate owners have a new company to go to for support called Soft Options.

The Graduate add-on offers IBM PC compatibility to Beeb owners, and Torch has always maintained that because it runs a large range of IBM PC software there is no need to produce software specifically for the Graduate.

However, A Sherman, one of the Graduate's designers, thinks differently and has set up his own company, Soft Options, to provide a 'much-needed' service for Graduate owners.

Its first release is a £40 utilities disc of seven programs, including one to convert MS-DOS files to Acorn DFS format, and a disc copier which exploits the Graduate's 1770 disc controller chip.

Soft Options, Century House, Swavesey, Cambridge CB4 5QG.

# BRING Twillstar INTO YOUR HOME

ALL PRICES INCLUDE VAT

## Computers

**MASTER 128**

| | |
|---|---|
| Complete With Internal Software | £454.25 |
| Master Turbo Upgrade | £113.95 |
| Master Econet Module | £46.00 |
| Master ET | £373.75 |
| Master 512 Upgrade | T.B.A. |
| Master SC Upgrade | T.B.A. |
| Eprom Cartridge | £14.95 |
| Welcome Guide | £10.00 |
| Reference Manual Part I | £14.95 |
| Reference Manual Part 2 | £14.95 |
| 6502 Second Processor | £179.00 |
| Z80 Second Processor | £379.00 |
| Acorn Prestel Adaptor | £125.00 |
| Acorn Teletext Receiver | £135.00 |
| Winchester Disk Drive 10 MBYTES | £1250.00 |
| Winchester Disk Drive 30 MBYTES | £1850.00 |
| IEEE Interface | £299.00 |
| Music 500 | £178.00 |

**ECONET ACCESSORIES**

| | |
|---|---|
| 100in Cable | £89.00 |
| 10ft Lead Set | £29.00 |
| Econet Starter Kit | £99.00 |
| Econet Bridge | £199.00 |
| Level I Fileserver 40 Track | £99.00 |
| Level 2 Filesaver 80 Track | £235.00 |
| Print Server Eprom | £49.00 |

## Disc Drives

**DISC DRIVES**

User Friendly Disk Drives 100% BBC compatible slimline disc drives. All drives are supplied complete with formatting diskette, comprehensive users manual and all necessary cables. All drives are 40/80 Track switchable at the front and have two years warranty.

**5¼" Drives without P.S.U.**

| | |
|---|---|
| MD 400A Single 400K Double Sided | £105.00 |
| MD 802C Dual 400K Double Sided | £189.00 |

**5¼" Drives with P.S.U.**

| | |
|---|---|
| MD 400B Single 400K Double Sided | £129.00 |
| MD 802E Dual 400K Double Sided | £235.00 |

**SPECIAL**

MD 802D Dual 400K Drives horizontally mounted in a monitor stand to fit both the BBC B and the Master series. **£255.00**

**OPUS CHALLENGER B**

A remarkable plug-in disk drive double density disc interface and superfast 256K RAM Disk with a full operating manual and unbeatable 2 year warranty. **£240.00**

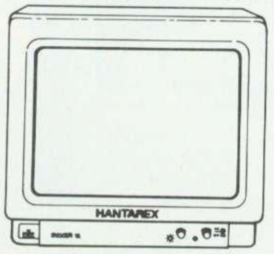
**CUMANA**

| | |
|---|---|
| CSX 100 (100K) 1 x 40 Track Single Sided Drive Excl. PSU | £79.35 |
| CS X 400 (400K)1 x 80 Track Double Sided Drive Excl. PSU | £113.85 |
| CDX 800S (800K) 2 x 80 Track Double Sided Drive Excl. PSU | £199.00 |
| CS 400 (400K) 1 x 80 Track Double Sided Drive Incl. PSU | £135.00 |
| CD 800S (800K) 2 x 80 Track Double Sided Drive Incl. PSU | £239.00 |
| Mitsubushi (400K) Single Disk Drives Case 40/80 Track Switchable with two years warranty. | £110.00 |

## Monitors

**MONOCHROME MONITORS**

| | |
|---|---|
| Phillips BM 7502 Green Screen | £79.00 |
| Phillips BM 7522 Amber Screen | £95.00 |
| Kaga KX 1202G Hi Res Green | £120.00 |
| Kaga KX 1203G Ultra Hi Res Amber | £120.00 |




Hantarex Box 12" Dark Glass Etched Green Screen Monitor superb value **£89.00**

**COLOUR MONITORS**

| | |
|---|---|
| Microvitec 1431 Std Res | £201.25 |
| Microvitec 1451 Med Res | £270.25 |
| Microvitec 1441 Hi Res | £391.00 |
| Microvitec 2030 Cs 20 Std Res | £425.50 |
| Microvitec 1431 AP Std Res | £224.25 |
| Microvitec 1451 Ap Med Res | £293.25 |
| Phillips CM 8501 STD Res Monitor with grey glass Screen RGB and Audio input | £209.00 |
| Phillips CM 8533 Med Res monitor with dark glass etched screen composite video input RGB and Audio Input. | £289.00 |

**SPECIAL OFFER**

Mitsubushi 1404 Medium Resolution Monitor with 640 X 200 Pixels RGB available with IBM or BBC Leads. **£239.00**



Kaga Super Vision *III* **£369.00**

This display is designed for business use which provides both high-res monochrome (Green, Amber, and White reverse) mode and high-res Colour graphic mode all in one.

Optional tilt stand with Quartz Clock is also available. **£25.00**

**TV MONITORS**

Phillips 1114 colour TV/monitor with 14" tube offedring 10 Preselect channels RF CVBS and RGB inputs **£199.00**

## BBC Upgrades

| | |
|---|---|
| 64K Upgrade Kit | £39.95 |
| 17/70 Upgrade Kit | £49.94 |
| ADFS ROM | £29.95 |
| Disc Upgrade Kit | £89.00 |
| Econet Upgrade Kit | £49.00 |
| Speech Upgrade Kit | £49.00 |
| DNFS ROM | £20.00 |

## TCL Special Package

The TCL All in One Word Processing Package contains a Master 128, View 3.0, Viewsheet, High Res Green Monitor, 800K Dual Drives with PSU, Quendata Daisy Wheel Printer together with a box of Discs, Paper, and all the Cables. **£914.25**

## Modems

**NIGHTINGALE MODEM**

| | |
|---|---|
| Including Commstar and Comprehensive Manual | £130.00 |
| Auto Dial/Auto Answer Board | £55.00 |
| Auto Dial Utilities Disc | £11.00 |
| OBBS Bulletin Software | £23.00 |

APPROVED

**DEMON MODEM**

With its Devilishly Clever features Auto Dial, Auto Redial, Auto Answer Full and Half Duplex European and USA Standards Complete with Power Supply Leads and Manuals Full Baud Rates

PROHIBITED

| | |
|---|---|
| Demon with BBC ROM | £81.00 |
| Dial Disc | £4.95 |

Disc double sided density 96 TP 1 uses 3m Media Guaranteed for life. Free library Box included **£17.00**

## TCL Special Workstation

No more messy wires



Mushroom Console

Once again TCL has answered a special need of all BBC Computer users with the new mushroom workstation. No more untidy wiring or pulled plugs. Transforms your system into a Handsome Console Unit.

**FEATURES INCLUDE:**

Advanced cable management Twin 400K Mitsubushi Slimline drives switchable from 40 to 80 track with status indicator LED's On board regulated 4amp power supply with overload protection Mains input filter for clean power supply Filtered power to the 3 take off sockets at rear for Micro, Monitor, and Printer.

Mushroom Workstation **£339.00**

## Printers

**DOT MATRIX PRINTERS**

**NOW AVAILABLE**

**Juki 5510 - Gives you 180 CPS & NLQ Standards £269.00 Inc. VAT**

...and thats not all! The Juki 5510 also has full graphics mode, two position 'dip-switch' (providing instsnt compatibility with both the Epsom and the IBM Graphic Printer). Standard 2K memory (expandable to 14K) built-in Parallel Centronics interface and 8-switch international character sets. If you need colour too, the optional Juki 5510 Colour Kit gives you seven colours. **£112.00**

**CITIZEN 120 D**

This new citizen 120D with 120 CPS and 25 CPS NLQ comes with tractor and friction feed as standard. IBM and Epson Compatible with TWO years Warranty **£159.00**

**CITIZEN MSPIO**

The new citizen MSPIO with 16 CPS Draft and 40 CPS NLQ. With TWO years Warranty **£269.00**

**KAGA KP810**

The 80 column printer with 140 CPS Draft and NLQ with friction and tractor feed offering 9 INT character sets. Long life cartridge ribbon and standard centronics interface. **£195.00**

Also available KAGA KP 910 (wide carriage printer) **£379.00**

**CENTRONICS GLP**

Complete with Tractor Adaptor offering 50 CPS Draft and 12 CPS NLQ **£125.00**

**EPSON LX80**

With 100 CPS draft and 16 CPS NLQ and optional tractor adaptor and sheet feeder. This printer has a standard parallel connection and accepts all other Epson serial Parellel boards with external dip switches for easy access and internal IK buffer. It offers a high specification at a low price. **£229.00**

**ALSO AVAILABLE**

| | |
|---|---|
| Epson FX 80 | £365.00 |
| Epson FX 100F/T | £495.00 |
| Epson FX 85 | £369.00 |
| Seikosha GP 50A (Parallel) | £69.00 |
| Seikosha GP 50S inc. Printer I/F + cables | £69.00 |
| Seikosha 1000A (NLQ) | £199.00 |
| Canon PW 1080A (NLQ) | £269.00 |
| Canon PW 1156A | £379.00 |
| Brother EP 44 | £228.00 |
| Shinwa CP 80A | £189.00 |
| MP 165 | £240.00 |
| Star SG 10 | £219.00 |

**SPECIAL OFFER OF THE MONTH**

| | |
|---|---|
| Brother HR 15 | £349.00 |
| Juki 6100 | £285.00 |
| Juki 2200 | £275.00 |
| Juki 6300 | £799.00 |

**DAISYWHEEL PRINTERS**

QUENDATA DWP 1120 with optional tractor/sheet feeder and 13" paper with facility. This Daisywheel printer with 20 CPS has 96 character printwheel compatible with the QUME. Standard centronics interface. (optional RS232 C) **£169.00**

**COLOUR PRINTERS**

| | |
|---|---|
| Canon PJ1080A | £440.00 |

# Printers

**TRACTOR ADAPTERS**
FX80 £33.00
LX80 £23.00
Juki 6100 £129.00
Juki 6300 £129.00
Quendata DWP 1120 £114.00
Brother HR 15 £95.00

**SHEET FEEDER**
Juki 6100 £173.00
Juki 6300 £173.00
Quendata DWP 1120 £165.00
Brother HR 15 £212.00
LX80 £55.00

**PRINTER RIBBONS**
Brother HR 5 £3.45
Brother EP 44 £2.65
Brother M1009 £4.60
Brother HR 15/25 £5.45
Multi-strike
Brother HR 15/25 fabric £4.85
Canon PW 1156A/1080 £6.85
Daisystep 2000 Multi-strike £4.00
Daisystep 2000 fabric £6.30
Epson FX/MX/RX80 £4.50
Epson LX80 £4.90
Epson MX100 £5.80
Epson LQ1500 £6.60
Epson DX multi-strike £5.40
Epson DX 100 fabric £4.85
Juki 6100 mulit-strike £3.20
Juki 6100 single-strike £1.95
Juki 6300 multi-strike £3.05
Juki 6300 fabric £4.10
Juki 2200 single-strike £2.95
Juki 2200 correctable £2.88
Kaga KP 810/910 £6.85
MP165 £4.50
OK 1 microline 80/82/83 £2.07
Quendata 2000 Multi-strike £3.97
Quendata 2000 fabric £6.30
Riteman 80 £6.30
Seikosha GP80 £4.00
Seikosha GP 100/250 £4.30
Seikosha GP 500 £4.95
Shinwa CP80 multi-strike £5.50
CP80 fabric £5.46
Walters WM80 multi-strike £5.30
Walters WM80 fabric £5.46
Wm2000 £5.90

**FONT AID**
NLQ Designer for Canon and Taxan KAGA NLQ Printers.
Design your own NLQ Fonts or download one of our 20+ predifined fonts. The Fontaid Disk includes the following type styles:- Square, Outline, Gothic, Bold, Computer Type, Bold Shadow, and Broadway.
Additional Disk 'A' Includes:- Greek/Matus Script, P.S., Plain Handwriting, and 2 styles of Elite, Condensed, & Super Condensed.
Fontaid requires 6264 RAM CHIP in print.
Fontaid BBC £30.00
Fontaid additional Disk £15.00
ROMS of individual fonts £18.00



Now available
Taxan Multipurpose Type Printer Buffer KIF-4308 compatible with any Centronics interface printer £149.00

# Accessories

**EPROMS**
2764 £2.20
27128 £3.95

**RAMS**
6264 LP 15 £3.95
EPROM Extactor £5.00
EPROM Eraser £32.00
Soft Life EPROM Blower £75.00

**POSEIDON**
The flexible videotex system with the Beeb Tel Terminal
Poseidon Floppy System £229.00
Poseidon Hard System £253.00
Beeb Tel Terminal Software £46.00
Beeb Tel & Terminal Software £79.00
Poseidon AES T.B.A.
Poseidon Multiuser Floppy Disk T.B.A.
Poseidon Multiuser Hard Disk T.B.A.

**COMPUTER**
BBC dust cover vinyl £3.50
BBC dust cover plastic £6.95
Data recorder complete
BBC lead £24.95
Tracker Ball £59.00
GRAFPAD II £59.00

**JOYSTICKS**
Voltmace 14b Handset £14.95
3b Singlet £12.95
3b Duelset £19.95
14b Interface £14.95
DRAWER Cassette £5.95
DATAPAD Keyboard £39.95

**DISC STORAGE**
10 × 5¼ Library case £2.00
70 × 5¼ Lockable £9.95

**SERIAL INTERFACES**
EPSON 8143 £34.00
JUKI £58.00
CANON £91.00
KAGA £85.00
Epson 8148 + 2K buffer £65.00

**LISTING PAPER**
11" × 9½ 2000 £14.00
Teleprinter Roll £4.50
Teleprinter Roll Holder £14.00

**PRINTER LABELS**
1000 90 × 36mm 1 across £5.70
1000 90 × 36mm 2 across £6.70
1000 90 × 36mm 3 across £7.70

**MONITOR ACCESSORIES**
Monitor stands single Metal £11.50
Monitor stands double plynth Metal £21.00

**BBC BOOKS**
The Adv. User Guide £12.95
The Adv. Basic ROM User Guide £7.95
The BBC Micro ROM Book £9.95
Guide to the BBC ROM £9.95
Basic ROM User Guide £9.95
Disk Drive Projects for Micro £5.95
The Adv. Disk User Guide for the BBC Micro £14.95
Get more from your Epson Printer £7.95
The Epson FX Kaga Printer commands revealed £5.95

**AMX MOUSE & SOFTWARE**
AMX Mouse with Super Art ROM £79.00
AMX Pagemaker £49.95
AMX 3D Zicon £24.95
AMX Database £24.95
AMX XAM £24.95
The Original AMX art Plus Utilities £14.95
AMX Paintpot £14.95
AMX Desk £24.95

**SYSTEM SOFTWARE**
THE MUSIC SYSTEM
Disk Pack £29.95
Cassette 1 £14.95
Cassette 2 £14.95

**EXPANSION BOARDS**
Computer Concepts Sideways Board £45.00

**RAMAMP**
RA20 +A4 £79.00
RA32N £59.00
RA32+ £58.00
ROM6S £32.00
RAM16 £32.00
WPK for all above £5.00

# BBC Firmware

**FIRMWARE**
Acorn View Word Processor £52.00
Acorn View Sheet £52.00
Acorn Logo ROM £65.00
Acorn ISO Pascal £65.00
Acorn BCPL £99.00
GXR £29.00
GXR B+ £29.00
View 3.0 £85.00
Hi-View £55.00
View Store £52.00
LISP ROM £49.00
BASIC Editor £28.00
Termulator £31.95
Microprolog £69.95

**COMCONCEPT**
Wordwise £36.00
Wordwise Plus £46.00
Intersheet £55.00
Disk Doctor £27.00
Printmaster (Epson) £27.00
Printmaster (Star) £27.00
Caretaker £27.00
raphics ROM £27.00
Communicator £59.00
Accelerator £55.00
Gremlin Debug ROM £27.00
Interchart £33.00
Speech ROM £30.00
Speech Processor £10.00

**BEEBUG**
Toolkit ROM £26.45
Toolkit Plus £39.00
Wordease £29.00
ICON Master £34.00
Studio Eight £22.00
ROMIT £34.00
Sleuth ROM £28.00
Help ROM £24.00
Exmom II £28.00
Spellcheck II £29.00
Spellcheck Wordwise £29.00
Spellcheck View £29.00

**CLAIRES**
Frontwise Plus £19.00
BROM £34.00
Wordease £27.00

**ALTRA**
Enigma Dish Imager £42.00
Tube Editor £42.00
Probe I £34.00
Basic Editor 2 £34.00
Basic Editor I £25.00
First Aid II £19.00

**GEMINI**
Datagem Database £79.00

**LBO**
Life & Business Organiser £19.50

**PACE**
Commstar £33.00
System ADE ROM £60.00
System SPY ROM £30.00
Edward User Pack £44.00
Edward Teacher Pack £25.00
BBC Ultracalc £25.00
Clares B ROM £32.00

**VINE**
Replay ROM £34.00
TD ROM £18.00

# Disc Utilities

View Index £14.90
View Printer Driver Generator £10.90
Hi View £55.20
Acorn Soft Database £14.25
Clares Database £21.85
Clares Graphdisc £12.30
Clares Replica III Disk £13.95
Clares the Key Disk £12.30
Betabase Utilities £11.00
Beta Accounts £21.95
Profile £11.00
Micro Text Disk £55.20
Beebugsoft Design £18.00
Beebugsoft Masterfile II £18.00
Beebugsoft Teletext Disk £10.90
Beebugsoft Sprites Disk £10.90
Beebugsoft Disk Master £18.00
Beebug Billboard Disk £18.00
Beebug Quickcalc Dish £14.25
Beebug 'Hershey' Font £14.25
Beebug Paintbox II Disk £12.30
Gemini DDD Base £29.00
Gemini DDD Calc £29.00
Gemini DDD Plot £29.00
Office Mate £12.00
Office Master £25.00
Fleet Street Editor £39.95

**GAMES DISK**
Elite £17.00
REVS £17.00
AVIATOR £17.00
SPEECH (Superior Software) £11.45
AND ALL LATEST

# Services

**SERVICES**
Fast Repair Service for the BBC Computer average charge from £23.00
Printer repairs from £20.00
Disk Drive repairs from £15.00

**BBC COMPUTER SPARE PARTS AND COMPONENTS**
PSU £59.00
Keyswitch £2.00
Complete Keyboard £59.00
Keyboard Connector £5.18
UHF Modulator £5.18
Video ULA £20.00
Serial ULA £16.00
6522 VIA £4.10
6502 2 MHZ CPU £7.50
UPD 7002 £17.25
6845SP CRT CON £7.50
SAA 550 Teletext £10.35
LM 324 £0.50
6522A 2 MHZ VIA £6.33
8271 £52.00
74 LS 123 £0.46
74 LS00 £0.28
74 LS04 £0.28
74 LS10 £0.28
7438 £0.46
74 LS 163 £0.86
74 LS 244 £0.92
74 LS 245 £1.27
74 LS 375 £1.04

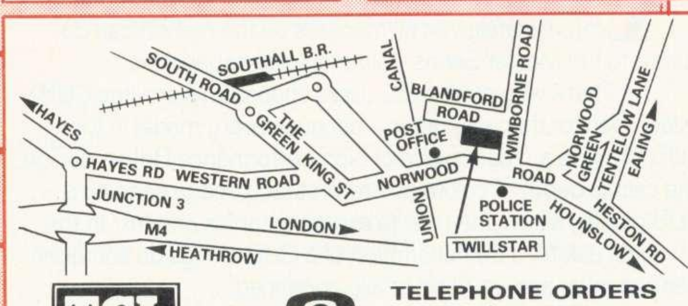
**CREDIT FACILITIES**
Full credit facilities now available nationwide
* LOW DEPOSITS
* FAST FRIENDLY SERVICE
* UP TO 3 YEARS TO PAY
We have negotiated with a leading Finance Company to provide this additional service for our clients.
Call for further details

# How to Order

**You may purchase any of the items listed by cheque made payable to TWILLSTAR COMPUTERS LTD.**

**All you have to do is list your requirements on a sheet of paper, and we will despatch your goods within 24 hours, subject to availability.**
**Please add the following amounts for Postage and Packing.**

Items below £10.00 add **£1.50**
Items below £50.00 add **£2.50**
Items below £100.00 add **£3.50**
Items over £100.00 add **£8.00**
All prices include VAT at 15%
'No Hidden Extras'
Access/Visa Card Holders:
Call us on our new Special Line
**01-571 5938 or 574 5271**




TCL

**TELEPHONE ORDERS**
**(01) 574 5271**
Telex No. 25247 attn TLL

## Twillstar Computers Limited

Apex House, Blandford Road,
Norwood Green, Southall, Middx. UB2 4HD

# CUB'S COLOURFUL MASTER PIECE




Acorn's BBC Master Series bring exciting new levels of sophistication to a proven family of micro computers. Unfortunately, not all monitors on the market can do justice to the Master Series' colour display capabilities.

That's why more BBC users choose a Microvitec CUB colour monitor than any other – because every model in the CUB family is a masterpiece of high performance British design. The clarity, depth of colour and rock steady image seen on a CUB display allows the user to exploit graphics and text to the full – just ask for a demonstration of a CUB alongside someone else's monitor and you'll be totally convinced.

In the meantime, the picture above amply demonstrates why a CUB is a delight to the eye in more ways than one.

| Model | Resolution | Screen | Bandwidth | Application |
|---|---|---|---|---|
| 1431/DS4 | Standard 452(H) x 550(V) | – | 18 MHz | Education, Home, Colour graphics use |
| 1451/DS4 | Medium 653(H) x 550(V) | Anti-glare | 18 MHz | 80 column, text-processing. High quality graphics. |
| 1441/DS4 | High 895(H) x 550(V) | Anti-glare | 18 MHz | High-resolution graphics and text applications. |

Available with tilt and swivel op''on. Also available are Microvitec's range of popular BBC-compatible metal cabinet monitors 1431/MS , 1451/MS4, 1441/MS4.

## TOUCH SCREEN OPERATION

Touchtech 501, designed for operation with all CUB metal cabinet monitors – the ultimate in user friendliness.



## BBC COMPATIBLE

For free, full colour brochure contact



MICROVITEC cub COLOUR MONITORS

Futures Way, Bolling Road, Bradford BD4 7TU, West Yorkshire.
Tel: (0274) 390011/726500. Telex: 517717 MVITEC G.

Available from High Street Computer Retailers and branches of W. H. Smith, Boots, John Lewis Partnership, Laskys and Currys.

# Instant video digitising for the Beeb

Wild Vision has produced a real-time image processing system for the Beeb – the Hawk V8.

The unit costs £970 and stores video images from a monochrome camera in the Beeb's screen memory. Direct memory access (DMA) means that the screen memory is continually updated without burdening the processor.

Unlike cheaper picture digitising systems for the Beeb which scan the image, the Hawk works in real-time, grabbing the image almost instantaneously and displaying it in either mode 0 or mode 2.

The system has already been used for a medical application – studying foot pressure patterns – and Wild Vision sees other applications as security systems, CAD, industrial inspection and scientific image analysis.

Hawk V8 comes as a board, which sits inside the Beeb's case, and image processing software.

Wild Vision, MARI House, 20-22 Jesmond Road, Newcastle-upon-Tyne NE2 4PQ.

# Clares adds fonts to printer driver

*This is Font one in normal size*
This is Font three in normal size
**This is Font five in normal size**
This is Font seven in normal size
This is Font nine in normal size
***This is Font eleven in normal size***

This is Font two in normal size
This is Font four in normal size
**This is Font six in normal size**
*This is Font eight in normal size*
*This is Font ten in normal size*
This is Font twelve in normal size

This is Font one in condensed size
This is Font nine in condensed size
This is Font three in condensed size
***This is Font eleven in condensed size***
This is Font seven in condensed size
This is Font twelve in condensed size

**Some of the type styles available in Clares' *Fontwise Plus* – not shown to actual size**

Clares has released six new pieces of software for the BBC micro and Master series.

*Fontwise Plus* improves the existing *Fontwise* printer driver so that it now works with *View* files, in addition to *Wordwise* and *Wordwise Plus*. The program allows text files to be printed in 12 type styles on an Epson-compatible printer. Cost is £20.

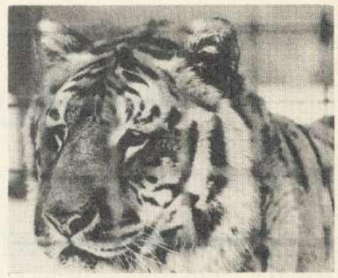
*Macrom* is a macro assembler for all Beebs including the Master 128, priced at £40. It will assemble 65C02 code as well as 6502.

Another upgrade, *Brom Plus* enhances the facilities of Clare's *Brom* toolkit ROM, which has been reduced to £20. The new version costs £34.50 and has utilities for discs and memory as well as Basic utilities.

*Statement* and *Stock Control* are the two latest additions to the *Beta Accounts* integrated accounting suite at £25 each.

Finally, Clares has put six of its best educational programs on one disc. *Educational Compendium* costs £12 – buying them separately would set you back £32.

Clares Micro Supplies, 98 Rudheath Road, Rudheath, Northwich, Cheshire CW9 7DA.



# Roma: £4000 from death

The life of Roma the tigress is still in the balance, with £4000 needed before the end of April.

Acorn employee Martin Grantham single-handedly took on the mammoth task of raising over £20,000 to build an enclosure at Linton Zoo, Cambridgeshire for Roma, who was made homeless when Knaresborough Zoo closed (*AU* March).

Response to his appeal has been tremendous, with £17,000 raised by early March – with *AU* readers contributing £750-£1000.

£4000 is still needed, but Mr Grantham is confident he will raise it. If he can't, the RSPCA will put Roma down.

Donations to The Save the Tiger Fund, Midland Bank, 52 St Andrews Street, Cambridge CB2 3AH. A/C no 41118722, sorting code 40-16-36.

# POST A PROBLEM

AS a result of pressure from readers, *Acorn User* now guarantees a fast reply service for enquiries. Your answer will be returned within 10 working days for just £2 (includes VAT), or your money back.

The idea is simple. Just write out your problem, fill in the coupon (right), and send both off to *Acorn User* with a stamped addressed envelope and cheque or postal order for £2. (If you want recorded delivery, add the cost of this on. The same goes for overseas readers.) Include as much detail as possible and a disc or cassette if a program is involved – with enough space to record any corrected listing.

We will then answer the problem and return all material received – within a guaranteed *10 working days* from receipt. If we fail to match this promise your cheque or postal order will be returned with the answered question. If we cannot answer the problem, the cheque will be sent back to you.

If you want a listing debugged, advice on hardware or software, or a list of addresses, send us your problems.

ACORN USER READER SERVICE
141-143 Drury Lane, London WC2B 5TF

Name ......................................................................

Address ......................................................................

......................................................................

......................................................................

...................................... Postcode ......................................

Daytime phone number ......................................

I enclose a cheque/postal order for £2 and an sae with my problem.

OFFICE USE ONLY Date in:
Date out:
Answered by:

# HSV COMPUTER SERVICES LIMITED

## COMPUTER SUPPLIES AT LOW LOW PRICES!

### CONTINUOUS STATIONERY

| | QTY 250 | 500 | 1000 | 2000 |
|---|---|---|---|---|
| 9.5" × 11" 60 GSM MICRO-PERF ALL EDGES | £2.95 | £4.95 | £8.95 | £14.95 |
| TRUE A4 90GSM MICRO-PERF ALL EDGES | £5.25 | £8.75 | £14.95 | — |
| LABELS 3.5" × 1.5" (1 across) | — | £2.95 | £4.95 | £9.50 |
| LABELS 4.0" × 1.5" (1 across) | — | £3.25 | £5.50 | £10.50 |
| LABELS 4.0" × 1.5" (2 across) | — | £3.75 | £6.50 | £11.95 |

### Fx80 STATIONERY (fixed tractor printers)

| | 250 | 500 | 1000 | 2000 |
|---|---|---|---|---|
| TRUE A4 80 GSM MICRO-PERF ALL EDGES | £6.95 | £11.75 | — | — |
| LABELS 4.0" × 1.5" (2 across) | — | £5.95 | £10.50 | — |

### PRINTER RIBBONS

| | EACH |
|---|---|
| **CANON PW1080A** | **£3.25** |
| EPSON FX/LX/MX/RX80 | £3.25 |
| JUKI 6100 S/S | £1.75 |
| JUKI 6100 M/S | £2.75 |
| MANNESMANN TALLY MT80/80+ | £4.75 |
| OKI MICROLINE 80/82/83 | £1.75 |
| SEIKOSHA GP80 | £2.75 |
| SHINWA CP80 | £4.75 |
| **TAXAN KAGA** | **£3.25** |
| WALTERS VM80 | £4.75 |

### DISKETTES (BOXED IN 10's)

**StorageMaster. LIFETIME GUARANTEE**

| | | |
|---|---|---|
| 3½" | SS/DD 135 TPI 80 TRACK | £24.95 |
| | DS/DD 135 TPI 80 TRACK | £32.95 |
| 5¼" | SS/DD 48 TPI 40 TRACK | £12.95 |
| | DS/DD 48 TPI 40 TRACK | £16.95 |
| | SS/QD 96 TPI 80 TRACK | £17.95 |
| | DS/QD 96 TPI 80 TRACK | £19.95 |

**UNBRANDED 5 YEAR GUARANTEE**

| | | |
|---|---|---|
| 3½" | SS/DD 135 TPI | £22.50 |
| | DS/DD 135 TPI | £28.95 |
| 5¼" | SS/DD 48 TPI | £8.95 |
| | DS/DD 48 TPI | £9.95 |

### DISKETTE STORAGE BOXES

| | PRICE EACH |
|---|---|
| 30 × 5¼ HINGED LID | £5.50 |
| 70 × 5¼ HINGED LID LOCKABLE | £10.95 |
| 100 × 5¼ HINGED LID LOCKABLE | £13.95 |
| 40 × 3½ HINGED LID LOCKABLE | £9.95 |

**ALL OUR PRICES INCLUDE CARRIAGE AND VAT – NO EXTRA'S TO PAY!**

Access

Access

HSV COMPUTER SERVICES LIMITED, 40-42 New Market Square, Basingstoke, Hants RG21 1HS (0256) 463507

AA151

HSV

# NOTICE BOARD

## ON SHOW

● 7-9 July, Third Insurance Information Exchange, Connaught Rooms, London WC2. Specialist exhibition including hardware and software for the insurance industry. More details from Caroline Fletcher on 01-242 5275.

● 9 July, Computers in Science, Lancaster Polytechnic, Preston. This event, which is part of a course for further education teachers, will be open to the public. Potential exhibitors contact Mrs Minall at the Polytechnic's Business and Industrial Centre.

● 24-27 July, Acorn User Exhibition, all the experts from *Acorn User* will be on tap at the Barbican in London. More details next month, and see the advertisement in this issue.

● 6-11 August, Festival Expo 86, Computers, Video Software and Games Exhibition, Stoke-on-Trent, Staffs.

One of twenty exhibitions being held between May and October as part of this year's huge National Garden Festival. Over three million visitors are expected to visit the festival's purpose-built 180 acre garden site during the five months it is open.

## FOR HELP

● To contact *Acorn User* authors, write to them c/o our new address: 141-143 Drury Lane, London WC2B 5TF.

● Remember you have until May 11 to register with the Data Protection Registrar if you are a business micro user who processes information about individuals. It costs £22 and failure to register is a criminal offence under the Data Protection Act, 1984.

Contact the Data Protection Registrar, Springfield House, Water Lane, Wilmslow, Cheshire SK9 5AX for advice and details.

● Seikosha AP/GP100 printer help sheets are available from *Acorn User* for 50p, plus sae. These consist of three programs, including a screen dump, and three pages of notes on using these printers.

## TO CONTACT

● Acorn, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN. Tel: (0223) 245200.

● Acornsoft, 645 Newmarket Road, Cambridge CB5 8PD. Tel: (0223) 214411.

● Acorn's bulletin board service is Prestel-compatible (1200/75 baud) and runs on (0223) 243642.

● *Acorn User* cassettes, discs, back issues and binders are available from PHS Mailings on (02934) 72208 (see page 104).

● *Acorn User's* page number on Micronet is 60043765. You can download *AU* software on 600611.

● BBC TV's *Micro Live* bulletin board is on 01-579 2288 (type INFO BBC on Telecom Gold electronic mail system).

● BBC Computer Literacy Project, Broadcasting Support Services, PO Box 7, London W3 6XJ. Please send sae.

● British Amateur Radio Teleprinter Group (BARTG) specialises in keyboard communications including RTTY, AMTOR (Amateur Telex Over Radio) and packet radio. BARTG also provides terminal unit kits and other communications hardware. For more details contact: Stuart Dodson, BARTG Chairman, G3PPD, 63 Malvern Avenue, South Harrow, Middlesex.

● Bulletin Boards: Two new bulletin boards are now available. BB-BBS (Brecon Beacons Bulletin Board Service) offers free software and hints and tips. The board operates on 300/300 baud and is currently open between 8pm and 8am on (0874) 730692. On-Line Systems Bulletin Board gives details of Hartlepool Computer Services range of new and second-hand computers. It operates on 1200/75 baud on (0429) 234346.

Other boards: BB-BBS (0874) 730692; CABB 01-631 3076; CBBS London 01-399 2136; Distel 01-679 1888; Forum 80 Hull (0482) 859169; Forum 80 London 01-399 2136; Grendel (0532) 620334; HAM-NET (0482) 497150; Liverpool Mailbox 051-428 8924; Mailbox 80 (0384) 635336; POTBUG (0782) 503254; On-Line Systems (0429) 34346; Owltel (BBC Publications) 01-927 5820; Technomatic 01-450 9764; TBBS London 01-348 9400; TBBS Nottingham (0602) 289783; TBBS Southampton (0703) 437200.

● MAPE (Micros and Primary Education), c/o Mrs G Jones, 76 Sudbrooke Holme Drive, Sudbrooke, Lincs LN2 2SF.

● MUSE (Micro Users in Schools and Education), PO Box 43, 231/2 Friary Chambers, Whitefriargate, Hull HU1 2HD. Tel: (0482) 20268. User group for teachers and parents. Please send sae.

● National Extension College, 18 Brooklands Avenue, Cambridge CB2 2HN.

● CET (Council for Education Technology), 3 Devonshire Street, London W1N 2BA. Please send sae.

● Software Limited configure CP/M programs for the BBC micro. Write for a catalogue to No 2 Alice Owen Technology Centre, 251 Goswell Road, London EC1N 7JQ. Tel: 01-833 1173.

## USER RAM

● Our thanks to Sebastian Lazareno of Ware, for telling us how to make the 16k *Acorn User* UserRAM work with the popular APTL ROM board.

The solution is simple, just make (ie connect) link 6 on the APTL board. This switches the write-protect facility from slot 15 on the APTL board (used for RAM) to the rest of the sockets on the board. Ideally a switch should be included in the link to allow you to switch the write-protect on and off as required.

## BLUNDERBOX

● A line managed to get cut out of the April edition of First Byte, the line in question is:

```
470 FOR pass=0 TO 3 STEP 3
```

Our sincere apologies to you and our thanks to Gordon Sheppard of London for pointing it out.

● Apologies for two bugs that crept into Tunemaker (March). Lines 710 and 1230 should read:

```
  710 IF notune% THEN PRINTT
AB(2,30)"NO TUNE IN MEMORY":
i%=INKEY(300):GOTO 750
 1230 IF key$="C" OR key$="c
" THEN PRINTTAB(32,5);SPC(5)
:INPUTTAB(32,5),tempo%
```

● Thanks to Jon Thackray for pointing out the error in the Master review on page 75 of the March issue. When specifying a filing system as part of a filename, the filing system name should be enclosed by hyphens, eg:

```
100 LOAD "-DISC-PROGRAM"
```

● Sorry! Mike Rawlings' article Sideways Storage in March contained a number of errors.

In the third paragraph on page 85 we stated listing 2 was the Tube compatible version – it should have read listing 3. And the caption to listing 2 on yellow page 114 should have read: 'Listing 2. A program for use on a Solidisk board'.

On page 86, 10 lines from the bottom of the first column, the listing line numbers should have read 902 to 909 not 1100 to 1170. Alternative lines to adapt integer read/write routines to handle two byte or three byte variables were missed from the yellow pages and you'll find them here:

**Listings 1 and 2 –two bytes**

```
1240 !&90=t+n*2:?&92=bk:?&93=2:
!&94=v
1300 !&90=t+n*2:?&92=bk:?&93=2
1320 =!&94 AND &FFFF
```

**Listings 1 and 2 – three bytes**

```
1240 !&90=t+n*3:?&92=bk:?&93=3:
!&94=v
1300 !&90=t+n*3:?&92=bk:?&93=3
1320 =!&94 AND &FFFFFF
```

**Listing 3 – two bytes**

```
1930 !&255=t+n*2
1950 ?&258=2
2020 !&255=t+n*2
2040 ?&258=2
2060 =!&259 AND &FFFF
```

**Listing 3 – three bytes**

```
1930 !&255=t+n*3
1950 ?&258=3
2020 !&255=t+n*3
2040 ?&258=3
2060 =!&259 AND &FFFFFF
```

**Listing 4 – two bytes**

```
1930 !&250=t+n*2
1950 ?&258=2
2020 !&255=t+n*2
2040 ?&258=2
2060 =!&259 AND &FFFF
```

**Listing 4 – three bytes**

```
1930 !&250=t+n*3
1950 ?&258=3
2020 !&255=t+n*3
2040 ?&258=3
2060 =!&259 AND &FFFFFF
```

# RSD CONNECTIONS LTD

| MONITOR LEADS | |
|---|---|
| BBC to Microvitec | £2.20 |
| TV to Computer | £1.25 |
| Green Screen | £2.95 |
| BBC to Fidelity etc. | £4.95 |
| QL to Fidelity etc. | £4.95 |
| COMMODORE to Fidelity etc. | £4.95 |
| Phono to Phono | £1.25 |
| BBC to Ferguson | £2.50 |
| QL to Microvitec | £2.50 |
| QL to mono monitor | £1.50 |
| BBC to Sony/Kaga | £5.95 |
| BNC to BNC | £2.95 |
| COMMODORE to Ferguson | £2.50 |
| BBC to Hitachi | £2.50 |
| SONY to Fidelity etc. | £6.50 |
| MSX to Ferguson | £2.50 |
| QL to Ferguson | £2.50 |

| IDC AMPHENOL | |
|---|---|
| 36-way plug | £4.95 |
| 36-way socket | £5.95 |
| 36-way plug (solder type) | £4.95 |

| DISK DRIVE LEADS | |
|---|---|
| Dual disk drive power lead | £4.50 |
| Dual disk drive lead 1m | £10.25 |
| Single disk drive power lead | £2.75 |
| Single disk drive lead 1m | £7.25 |
| Disk drive extn. lead 1m | £7.25 |
| AMSTRAD 2nd DRIVE | £6·95 |

| CASSETTE LEADS | |
|---|---|
| BBC to cassette | £2.25 |
| DRAGON to cassette | £2.20 |
| SPECTRUM to cassette | £1.25 |
| BBC to Acorn cassette | £2.25 |
| AMSTRAD to cassette | £2·20 |

| PRINTER LEADS — ALL 1 METRE LENGTH | |
|---|---|
| BBC | £9.95 |
| BBC serial | £8.95 |
| AMSTRAD | £10.75 |
| MEMOTECH | £12.75 |
| EINSTEIN | £12.75 |
| IBM PC | £15.75 |
| SPECTRUM interface One to RS 232 | £9.75 |
| ATARI | £15.25 |
| MSX | £13.95 |
| APRICOT | £15.20 |
| DRAGON | £9.95 |
| QL | £10.75 |

ANY COMBINATION OF LEADS MADE TO ORDER

| RIBBON CABLE (Price per ft) | Grey | Rainbow |
|---|---|---|
| 9-way | .13 | .24 |
| 10-way | .15 | .28 |
| 14-way | .18 | .32 |
| 15-way | .20 | .36 |
| 16-way | .22 | .40 |
| 20-way | .30 | .50 |
| 24-way | .36 | .60 |
| 25-way | .40 | .65 |
| 26-way | .45 | .70 |
| 34-way | .60 | .80 |
| 37-way | .65 | .85 |
| 40-way | .70 | .90 |
| 50-way | .95 | £1.25 |
| 60-way | £1.10 | £1.40 |
| 64-way | £1.15 | £1.50 |

| EDGE CONNECTORS | |
|---|---|
| 2 × 23-way (ZX-81) | £1.85 |
| 2 × 28-way (Spectrum) | £2.10 |
| DOUBLE SIDED PLUG BOARDS | |
| ZX-81 23-way | £1.35 |
| Spectrum 28-way | £1.50 |
| ADDITIONAL IDC | |
| 56-way Card Edge for Extension Lead | £4.25 |

| D CONNECTORS Solder Bucket | Male | Female |
|---|---|---|
| 9-way | .75 | £1.00 |
| 15-way | .95 | £1.50 |
| 25-way | £1.50 | £1.90 |
| 37-way | £2.40 | £3.25 |
| HOODS .95 | | |

| TELEPHONE CONNS | |
|---|---|
| Surface master jack socket | £3.75 |
| Surface extn socket | £2.50 |
| Dual outlet adaptor | £4.25 |
| Line jack cord 3mtr | £1.85 |
| 4 core cable per metre | 15p |
| BT Plugs | 48p |

| CONNECTORS IDC | Card Edge | Trans PCB | 2 Row Socket |
|---|---|---|---|
| 10-way | £1.20 | £0.85 | £0.80 |
| 14-way | — | — | £0.90 |
| 16-way | £1.60 | £1.20 | £1.00 |
| 20-way | £1.90 | £1.35 | £1.20 |
| 26-way | £2.40 | £1.60 | £1.45 |
| 34-way | £3.10 | £1.95 | £1.60 |
| 40-way | £3.40 | £2.00 | £1.85 |
| 50-way | £3.85 | £2.25 | £2.00 |
| 60-way | £4.80 | £2.60 | £2.25 |

| SPECTRUM EXTENSION LEADS | |
|---|---|
| 6 inch extension cable M to F | £10.50 |
| 6 inch F to 2M's | £14.75 |
| 12 inch extension cable M to F | £10.75 |

| IDC SHROUDED HEADERS WITH EJECTING LOCKING ARMS | Straight | Right Angle |
|---|---|---|
| 10-way | .85 | .90 |
| 14-way | £1.00 | £1.20 |
| 16-way | £1.25 | £1.45 |
| 20-way | £1.40 | £1.60 |
| 26-way | £1.70 | £1.95 |
| 34-way | £2.00 | £2.30 |
| 40-way | £2.15 | £2.45 |
| 50-way | £2.30 | £2.65 |
| 60-way | £2.45 | £2.85 |

BBC MONITOR STAND




ONLY £11.95

DISTRIBUTION SOCKET




4-way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals. Allows the whole system to be switched on from one plug.
ONLY £9.50

| SPECTRUM DRIVES | |
|---|---|
| RS232 WAFA lead 1m | £10.50 |
| Centronics WAFA lead 1m | £10.50 |
| Micro Extn. lead 12" | £6.00 |

| IDC D CONNECTORS | Male | Female |
|---|---|---|
| 9-way | £2.70 | £3.20 |
| 15-way | £3.20 | £3.70 |
| 25-way | £3.80 | £4.45 |
| 37-way | £5.90 | £6.80 |

TRADE ENQUIRIES WELCOME

75p P&P IN UK. Access & Visa accepted. Add 15% VAT to all orders
Cheques made payable to
RSD Connections Ltd, Dept AC5.
PO Box 1, Ware, Herts.
Tel: 0920 5285/66284



# DDX iMAGiN.A

BRITISH BROADCASTING CORPORATION
MASTER SERIES MICROCOMPUTER

DDX, our powerful and popular 2-D CAD system and iMAGiN.A, our new document illustrator are both now available in specially-developed versions for the Master Series computers. These latest versions take full advantage of the improved memory management, graphics and extra speed of the Master Series to make them even more effective aids to design, drafting, graphics and illustration.

DDX is a versatile drafting system, widely used in professional design offices and in higher education. The unusually sophisticated input routine accepts a very wide range of coordinate formats and the screen cursor may be controlled directly by the cursor keys and a mouse, trackerball, Grafpad, joystick. An impressive list of single-key mnemonic commands (keycodes) ranges from several line types through circles, arcs, ellipses, etc. to facilities found on up-market CAD systems - dimensioning, area measurement, macros, .... Output suits most dot-matrix printers and optional drivers are available for most low-cost plotters and for professional digitisers. DDX is available for the BBC model B (and B+) at £125 and the Master Series & B+128 at £150.

iMAGiN.A is a system for creating illustrated documents. It can be used with View, Wordwise, or any other word-processor which allows you to use the two new commands *image and *imagin to print text and graphics together and to integrate graphics into document files. Graphics can be created using the iMAGiN.A artwork editor or taken from other software. iMAGiN.A is a document-based system - not simply a page make-up program - all your normal word-processor editing facilities and printer typefaces are retained and no limit is placed on the number of pages or images in a document.

The iMAGiN.A artwork editor features user-friendly icons and pull-down menus and can be controlled almost entirely by mouse, trackerball, Grafpad or cursor keys - no commands to remember and minimal keyboard use. There is a choice of line styles, brushes, and large text fonts, and you can choose from a selection of standard fill patterns, typefaces and symbols, or design your own using the utility programs provided. Drawing facilities include rectangles, polygons, circles, arcs, ellipses, painting, pattern-fill, clipboard, copy, move, erase, rubber-banding, snap-on grid, on-line help, .... Images up to 8 × 9 in. may be printed on most dot-matrix printers. iMAGiN.A is available for the BBC model B+128 with the Acornsoft GXR ROM or for the Master Series and costs just £50.

Our growing range of personal design software for the BBC micro also includes Digital Drawings, a simple 2-D CAD program at £65, 3-D View, a wireframe modeller/perspective generator at £35 (with optional plotter drivers from £15) and ICE, a thermal insulation/condensation evaluator at £35. Please add £2 carriage plus 15% VAT to all prices and enclose a cheque with your order or ask for more details from:

IBBOTSONS DESIGN SOFTWARE
The Byre . Ecclesbourne Lane
Idridgehay . Derbyshire
DE4 4JB
tel. 077 389 658



# MIRRORSOFT BY MAIL ORDER

The entire Mirrorsoft range of quality software is now available by mail direct from our warehouse, with no charge for postage and packing.
Send for our free colour catalogue, tool
We accept cheques, postal orders, Access, VISA, and American Express. Please allow 28 days for delivery.
Prices given are for tape versions. Please add £3 for 5.25'' disks.

**GAMES**

| | | |
|---|---|---|
| Caesar the Cat | | £6.95 |
| Hi Bouncer | | £6.95 |
| Strike Force Harrier | | £9.95 |

**EARLY LEARNING/CHILDREN'S ENTERTAINMENT**

| | | |
|---|---|---|
| Caesar's Travels (disk) | Ages 3–9 | £12.95 |
| Count with Oliver | Ages 4–7 | £7.95 |
| Crack It! Towers | Age 7+ | £9.95 |
| First Steps with the Mr Men | Ages 3–6 | £8.95 |
| Giddy Game Show | Ages 3–6 | £9.95 |
| Here & There with the Mr Men | Ages 4–7 | £7.95 |
| Invisible Mr Men | Ages 3–7 | £9.95 |
| Look Sharp! | Ages 5–11 | £7.95 |
| Mr Men Magic Storymaker | Ages 4–7 | £9.95 |
| Quick Thinking! | Ages 5–11 | £6.95 |
| Quick Thinking Plus! | Ages 5–11 | £6.95 |
| Word Games with the Mr Men | Ages 5–8 | £9.95 |

**CREATIVE COMPUTING**

| | |
|---|---|
| Fleet Street Editor (disk) | £39.95 |

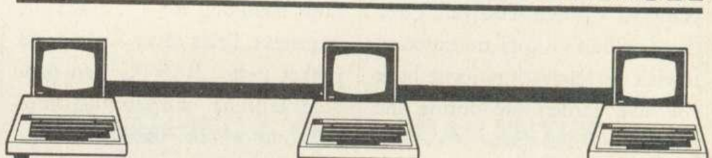
**HOME DISCOVERY**

| | |
|---|---|
| BBC Mastermind | £9.95 |
| BBC Quizmaster | £5.95 |
| Joffe Plan | £9.95 |
| Know Your Own Psi Q | £9.95 |
| Know Your Own Personality | £9.95 |
| Star Seeker | £9.95 |

MIRRORSOFT
FREEPOST BS4382, Paulton, Bristol BS18 5BR



# ECONET ENHANCEMENT SOFTWARE FROM DSL



## ECONET UTILITIES

A suite of machine-code programs which vastly increases the power and flexibility of any Econet System.
Ideal for Education, the package provides such features as:

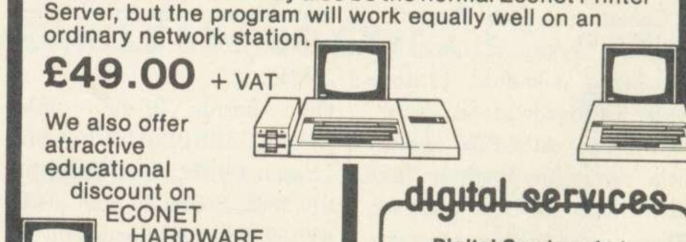
| | | | |
|---|---|---|---|
| FORCE | LOGON | LIST | CONT |
| SEND | LOGOFF | TYPE | FILEINFO |
| SENDALL | DISC-NET COPY | DUMP | COMPARE |
| SHOUT | INTERDIRECTORY | BUILD | TIME |
| DATE | COPY | HALT | |

It even speeds up network-access by a factor of up to 64 times. **£75.00** + VAT

## DUMPS

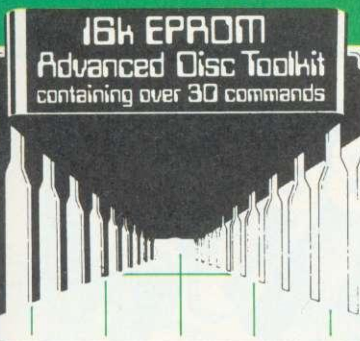
This package allows full graphics screen-dumps to be performed down the network.
Only one screen-dump ROM, (such as Printmaster), is required on the network and this is allocated as the DumPS station. All other stations will then be able to send graphics down the network to this.
The DumPS station may also be the normal Econet Printer-Server, but the program will work equally well on an ordinary network station.

**£49.00** + VAT



We also offer attractive educational discount on ECONET HARDWARE

digital services
Digital Services Ltd.
159 Havant Road, Drayton,
Portsmouth, Hampshire.
Telephone (0705) 324934




# Advanced Computer Products

Advanced Computer Products
6 Ava House High Street
Chobham Surrey GU24 8LZ
(0276) 76545

**SEE SPECIAL OFFERS**
**Available while stocks last**

**MASTER COMPATIBLE**

Any Acorn user ...including... BBC B, B+, Electron, DFS, 1770 DFS, ADFS, 2nd. processor etc. OUR BEST SELLING Advanced Disc Toolkit. The ultimate toolkit, useful to all, invaluable to disc users, an absolute delight for ADFS users! Over 30 commands including:- file transfer (inc LOCKED cassette files to disc, DFS to ADFS), full memory & disc editor, menu, ADFS utilities, search memory/basic/disc, load & run below page, catalogue/unplug ROMS etc. etc. etc. (supplied on 16k EPROM)

"It's excellent value for money" .... (Acorn User) "Take a close look at ADT-it's suberb" .... (Database publications)

BBC users ... at last you can use probably the most powerful disc filing system available! - Acorn's ADFS. BBC B+ owners can use ADFS immediately BBC B users must upgrade first to 1770 disc interface/DFS
ADFS ........ £26.08 (+VAT)
1770 upgrade ..... £43.44 (+VAT)

Electron & Plus 1 users..Advanced Rom Adaptors I & II our popular Plus 1 adaptors continue to allow compatible EPROMS to be fitted to the Electron. A.R.A. II (cont. 2 sockets) also upgradable to RAM (suitable for user's own routines)

**A.R.A. II MASTER COMPATIBLE**

Electron & Plus 3 users ... gain BBC compatibility by adding the Advanced Electron DFS (1770 DFS) this is the same disc filing system supplied with the BBC B+. Now you can produce and access (compatible) BBC disc based software. A.C.P. also supplies 5¼" disc drives to add to your Plus 3 (inc. 2nd. drive adaptor). These enhance your system to both of Acorn's disc filing systems and both formats. (supplied on 16k EPROM)

**The Advanced Disc Investigator**

A very powerful Disc Utility ROM for standard and non-standard discs
* BBC, B+ Electron and Master Series
* Acorn 8271 DFS 0.9, DFS 1.20
* Acorn 1770 DFS, ADFS (including Acorn compatible DFS's)

**Features:**
* backup most protected discs
* copy 40 track discs onto 80 track discs
* verify two non-standard discs
* edit any type of non-standard disc
* check and repair faulty tracks
* create new disc formats
* can operate in single and double density with 1770
* 16K EPROM plus detailed instruction manual

**NOW AVAILABLE**

**The Advanced Plus Four (A.P. 4)**
* A FULLY ACORN COMPATIBLE disc I/face for the 'ELK' & Plus 1
* Accepts any standard 5 ¼" or 3 ½" disc drive with PSU
* Supplied with 1770 DFS (as supplied on the B+ & Master series) (A.E.D. is still available for Plus 3 users @ £24.15 inc.)
* Page stays @ &EOO, the same as Tape F.S. NO LOSS of RAM
* Will allow more tape software to be run from disc
* Access compatible BBC disc-based software. No conversion program needed
* Extra sideways ROM socket fitted as standard (will take ADFS when avail.)
* A self-contained, well finished and fully tested product
* No 'short cuts' in design, finish or components
* ROM s/ware includes format, verify, free space and utils.
* Achieve greater BBC compatibility £69.55 (+VAT)

**Special Intro Packages**

80 track double sided 3½" **OR** 40T s/s 5¼" DRIVE & A.P. 4 ~~£209.29~~
40/80 switchable track, double sided 5¼" DRIVE & A.P. 4 ~~£230.93~~
*Please phone for prices*

Electron & Plus 1 users - Advanced Plus 5 (A.P.5)... coming soon the ultimate interface for your Electron! Adds:- 1) the user port 2) the 1 MHz bus 3) upgrade to the 'tube' i face 4) 2/3 ROM/EPROM sockets. These will permit many graphic, control, and user applications, to be connected. Also upgrading to the 'tube' will allow Acorn's 2nd processors to be connected, greatly increasing BOTH the memory and the speed of your computer

| | | | | | | |
|---|---|---|---|---|---|---|
| __ View cartridge | (e) | @ £17.95 | __ A.D.T. (16k EPROM) | (be) | @ £34.50 | __ |
| __ V/Sheet cart. | (e) | @ £17.95 | __ A.R.A. I (cart.) | (e) | @ £10.35 | __ |
| __ Lisp cartridge | (e) | @ £9.95 | __ A.R.A. II (cart.) | (e) | @ £14.95 | __ |
| __ Logo cartridge | (e) | @ £54.95 | __ A.S.R. | (e) | @ £29.90 | __ |
| __ ISO Pascal cart. | (e) | @ £54.90 | __ A.E.D. (16k EPROM) | (e) | @ £24.15 | __ |
| __ E.Adv.Usr Guide | (e) | @ £4.95 | __ A.D.I. (16k EPROM) | (be) | @ £28.75 | __ |
| __ +3 2nd.drv.adp. | (e) | @ £7.95 | __ A.P.4 | (e) | @ £79.98 | __ |
| __ 5 ¼" drve from | (e) | @ £159.95 | *Special Offers* | | | |
| __ 3 ½" drve from | (e) | @ £135.95 | | | | |
| __ 3 ½" discs (10) | (e) | @ £29.00 | __ 16k EPROMS | (be) | @ £4.25 | __ |
| __ A.D.F.S. | (b) | @ £29.99 | __ 16k EPROMS (4+) | (be) | @ £3.75 | __ |
| __ 1770 disc up grade | (b) | @ £49.95 | __ 8k Static RAM | (be) | @ £4.50 | __ |

(Product codes ... b=BBC, e=Electron)

I enclose payment for....£

My Name ______

Address ______

**Advanced Computer Products**
6 Ava House, High Street, Chobham, Surrey. GU24 8LZ
0276 76545

REF A 12

Tel ______

ORDER NOW

VISA Access

Electron & Tube are trade marks of Acorn Computers Ltd.




Communicating with the outside world can present its own special problems. Fortunately help is at hand for BBC users in the form of Nightingale and Commstar.

The Nightingale modem has become the standard by which others are judged. Combining simplicity of use with true multi-baud rate operation, Nightingale can provide access to both Viewdata (1200/75 & 75/1200 baud) and full duplex (300/300 baud) systems. Furthermore, Nightingale can be expanded to include auto dial/auto answer facilities with full software control.

Commstar THE communications software for the BBC, *is now better than ever!* The new enhanced version now available on a 16K Eprom is totally compatible with the new Master Series BBC computer. Commstar's features are too numerous to list here, so please ask for a fact sheet.

Available also for Commstar, is a Technical Appendix Manual for advanced users.




APPROVED for use with telecommunication systems run by British Telecommunications in accordance with the conditions in the instructions for use.
S/2592/3/E/500065

Nightingale and Commstar are available direct from Pace or from good dealers everywhere.

| | |
|---|---|
| **Nightingale Modem** | **£119.00** |
| **Commstar** | **£29.57** |
| **Nightingale/Commstar Combination** | **£139.00** |
| **Commstar Technical Appendix** | **£5.00** |

Please add carriage and V.A.T. to the above prices.
P & P (U.K.): £0.75 with Nightingale £2.50.

Comprehensive fact sheets are available for these and other Pace products.

Access VISA

PACE

**PACE Micro Technology**
Juniper View, Allerton Road, Bradford, West Yorkshire.
Tel. 0274 488211 Telex No. 51338
Prestel Mailbox No. 274 729306
Telecom Gold Mailbox No. PCE 001
Int. Tel. No. +44 274 488211

Now compatible with BRITISH BROADCASTING CORPORATION MASTER SERIES MICROCOMPUTER

# We thought it was about time we put you in the picture.




When we introduced our AMX Mouse to BBC Micro users, the response was phenomenal.

And no wonder!

It was regarded as 'pushing the BBC to its limits' and hailed by the press as 'probably the best input device that has appeared recently'. The AMX Mouse brought to BBC Micro users the same sophisticated, positive control that had, until then, been the province of the more expensive computers, like the Macintosh.

Now we announce a new enhanced software package which, can be used with a traditional keyboard or joystick but truly comes into its own when used with the AMX Mouse.

AMX Super ROM and Super Art adds colour to the features of the original AMX ROM, on a new 16K ROM.

It dramatically extends the original AMX ROM facilities to include Pull Down Menus, over lapping colour windows, colour patterns and an extended Icon set in all graphic modes.

Specially written to be usable with the vast majority of BBC Systems including 2nd processors, the Aries RAM Board, the BBC + Shadow mode, tape, DFS and ADFS.

The kernel of the Super Art program is included in the 16K ROM, providing tape and disc users with a Mode 1 colour drawing program.

But Super Art really comes into its own when used on a disc based system; a host of additional facilities can be selected direct from the screen.

Colour pictures can be created in dot resolution up to A4 size by scrolling the screen window, over the picture.

Other facilities include colour pattern editing – use of icons, additional text styles, various copy facilities and a superb colour Zoom.

Pictures can be printed out in colour (Integrex) or shades of black and grey on Epson compatible printers.

The results can be astonishing! – you can even store your finished 'masterpieces'.

The AMX Icon Designer facility gives you further freedom to design and store your own custom icons for use in your own programs.

This fabulous new package costs only £89.95 – a price as remarkable as the package itself – and includes a fully illustrated operating manual.

If, however, you are afraid of mice, you can purchase just the software package plus the 16K Super ROM for just £49.95.

You will still achieve some pretty remarkable results using your keyboard or joystick – not nearly as good as with the Mouse of course – but you can always add one later on for just £40.

Then you'll really be 'in the picture'.




**AMX MOUSE**

IMAGINATION AT YOUR FINGERTIPS

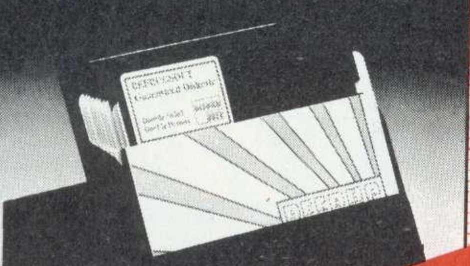
**BOTH THESE EXCITING PACKAGES ALONG WITH OUR SUPERB RANGE OF AMX ROM AND SUPER ROM COMPATIBLE SOFTWARE ARE AVAILABLE FROM ALL GOOD COMPUTER DEALERS OR BY SENDING CHEQUE OR PO TO ADVANCED MEMORY SYSTEMS LTD, FREEPOST, WARRINGTON WA4 1BR TELEX 628672 AMSG**
**FOR INSTANT ACCESS OR VISA ORDERS, RING (0925) 413501**

# DYNAMIC DISCS

## TESTED BY BEEBUG

**BEEBUG, the largest independent computer user group in the UK, offer 100% tested discs supplied by one of Britain's leading disc manufacturers.**

**10** FREE LIBRARY CASE



Orders for 10 discs are sent in black plastic library ca[se]

**25** FREE STORAGE BOX



**SPECIAL OFFER ON 96 TPI D/S D/D DISCS**
Use the voucher below to claim £2 off 10, £4 off 25 or £8 off 50 discs.

**50** FREE STORAGE BOX



Orders for 50 are delivered in strong plastic Storage box with 4 dividers.

## COMPARE PRICES

4 Types of Disc To Meet Your Exact Requirement

**48 TPI DOUBLE DENSITY**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 10 | S/S D/D | £14.90 | | 10 | D/S D/D | £20.50 |
| 25 | S/S D/D | £34.90 | | 25 | D/S D/D | £46.20 |
| 50 | S/S D/D | £59.30 | | 50 | D/S D/D | £82.40 |

**96 TPI DOUBLE DENSITY**

| | | | | | | |
|---|---|---|---|---|---|---|
| 10 | S/S D/D | £20.50 | | 10 | D/S D/D | £21.90 |
| 25 | S/S D/D | £46.20 | | 25 | D/S D/D | £49.90 |
| 50 | S/S D/D | £82.40 | | 50 | D/S D/D | £93.50 |

All prices include Storage Box, VAT and delivery to your door (UK)

Suitable for BBC Micro and all other computers using 5¼ inch discs including Atari and Commodore.

Fully Guaranteed — Not only by Beebug but by one of the UK's top disc manufacturers.

## ORDER FORM

Official orders welcome
Access/Barclaycard
24 hrs line 0494 816666
Further information
on helpline 0727 40303

Please supply me
______ @ £ ______
______ @ £ ______
______ @ £ ______
Total cheque enc. £ ______

Name ______
Address ______

To Beebugsoft, PO Box 109, High Wycombe, Bucks. HP10 8NP

**VOUCHER**
**96 TPI D/S D/D**
**£2 OFF 10**
**£4 OFF 25**
**£8 OFF 50**

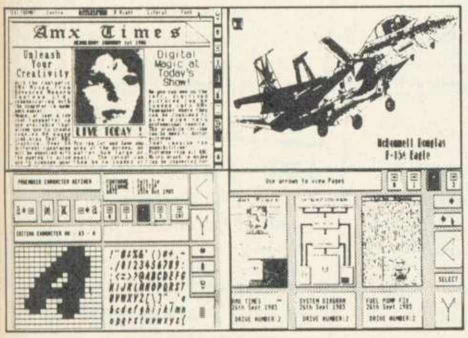
MASTER COMPATIBLE
VERSION OUT NOW

When the press use such words as 'Phenomenal', 'Outstanding', 'Ideal' and 'Worth Every Penny', they've obviously discovered something rather special.

But when that something turns out to be a product in which they are already expert, then it must be something very special indeed. The object of their enthusiasm is AMX Pagemaker – a revolutionary software program that will produce newspapers, posters, leaflets, notices and hand-outs – in fact anything where text and graphics are required, to an extraordinary professional standard.

It's a complete graphics design system and word processor rolled into one.

AMX Pagemaker consists of two Roms and two discs therefore it will work on a standard BBC or B+ micro without a Rom board.




AMX Pagemaker is fully compatible with either the AMX Mouse – joystick or keyboard and requires the minimum of a single 40 track disc drive. It has real time graphics with fast continuous scrolling up and down an A4 page and uses Mode 0, the highest graphics resolution on the BBC.




# The program that's making front page news.

## READ ALL ABOUT IT.

You can type directly on to the screen, with any of the 16 typefaces supplied or design your own, alternatively, you can load in wordwise and view files with fully automatic on screen text formating as they load. Either way centering, ragged right and literal justification are all available. There is full pixel resolution control over character size and spacing: Also included is a Micro justification facility.

## EXTRA, EXTRA.

There are outstanding facilities for drawing, spraying and painting, using either the patterns supplied, or your own pattern designs, enabling you to achieve some incredible graphic results. A complete Mode conversion program is included allowing you to load in drawings and digitised pictures from all BBC graphic modes. The cut and paste facilities include: copying, moving, rotating, stretching and a fantastic zoom is also available.

The previewer allows you to view three A4 pages at any time, before work is output to a wide range of dot matrix printers including: Epson FX/RX/LX/LQ, Canon PW-1080, Kaga KP810, Mannesman Tally MT-80+, Seikosha SP-1000A, Star Delta, Star SG10. And any that are compatible with the above.

AMX Pagemaker is your opportunity to join the publishing revolution, it comes complete with a comprehensive manual which the press describes as 'Superb'.

At only £49.95 the cost of the Pagemaker is as amazing as the program itself.

Let's leave the last word to the press.

*"Pagemaker" is phenomenal – it lends itself to creating anything where text and graphics are involved – notices, posters, leaflets, hand-outs, newsheets. Packages like this have been the province of the 16 – bit micros until now, this product is worth every penny of £49.95."

* 'Educational Computing', January 1986.

This superb package is available from all good computer dealers or direct using the Freepost order form below.

PLEASE RUSH ME POST FREE ________ (Quantity)
AMX PAGEMAKER PACKAGE/S AT £49.95 EACH
INCLUDING VAT AND P & P.
I ENCLOSE CHEQUE/POSTAL ORDER FOR
£________ OR DEBIT MY

ACCESS OR VISA
CARD NO.

EXPIRY DATE ________
SIGNATURE ________
NAME ________
ADDRESS ________
________
________ POSTCODE ________

**AMX PAGEMAKER**

IMAGINATION AT YOUR FINGERTIPS

SEND TO: ADVANCED MEMORY SYSTEMS LTD.,
FREEPOST, WARRINGTON WA4 1BR.
TELEX 628672 AMS G.

☎ FOR INSTANT ACCESS OR VISA ORDERS RING 0925-413501/2/3

# TODAY'S ROMs

SYSTEM
Dept. A
12 Collegiate Crescent
Sheffield S10 2BA
(0742) 682321

# FOR THE BBC MICRO FROM SYSTEM SOFTWARE

## ADE

The complete program development package for assembly language programmers. ADE is the de facto industry standard for professional software writers using the BBC microcomputer. The 16k ROM contains a full 6502 MACRO assembler; a dynamic text editor; a front panel debugging monitor and disassembler. ADE comes complete with a 160 page comprehensive reference manual and a utility/macro library disc.

### ASSEMBLER

The ASSEMBLER features macros with library facilities; nestable conditional assembly; flexible listing options (with or without macro expansion); hex, decimal, binary and ASCII data formats; dummy sections; full range of arithmetic and logical operators; symbol table sort and dump; file chaining and 29 powerful pseudo ops. Source and object files are kept on disc so there is no limit on program size or location. Now significantly enhanced to include local label BLOCK command, and can output to any number of object files. Use with the 2nd processor for really fast assembly.

### EDITOR

The EDITOR is designed with the programmer in mind for writing both programs and documentation. The editor includes a very powerful command language (including macros) that enables much editing to be done on a semi-automatic basis. It features full screen editing and deferred edit modes; no limit to document size; edit with backup facilities and a versatile text formatter.

Now includes 80 column mode when using the 2nd processor.

### DEBUGGER

The DEBUGGER is instantly accessible for inspecting, modifying and disassembling machine code programs. Features include full 64 byte display in hex, ASCII and disassembled format; registers; stack; single step; breakpoints; memory search and much more.

**Price £60 inc vat.**
Please specify 40 or 80T utility disc.

## SPY 2

SPY2 is a front panel debugging monitor, disassembler and disc utility ROM. SPY2 is instantly accessible to the programmer for inspecting, modifying, debugging and disassembling machine code programs. SPY2 also features a relocator and program trace facilities. SPY2 will access any ROM either in the sideways ROM sockets or on an extension board. ROM memory may be displayed, single-stepped through or disassembled.

SPY2 includes a set of powerful disc recovery commands for interrogating, editing and retrieving data stored on a floppy disc. SPY2 also includes a disc formatter as well as a non-destructive single track reformatter.

In all SPY2 has a comprehensive set of 23 utility commands. These are supported by an excellent Reference Manual.

### EASY TO USE . . . . .

The SPY2 front panel encompasses all the superb, easy-to-use facilities of the renowned SPY debugging monitor PLUS additional commands for toggling and finding breakpoints; relocating machine code programs; single stepping through subroutines in one go and faciliities for accessing the front panel from programs in RAM or ROM with breakpoints, OSBYTE or CTR-F.

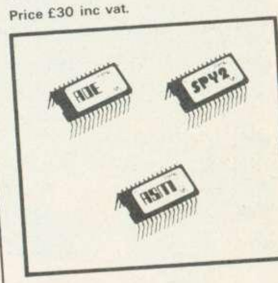
SPY2 features a versatile disassembler with hex dump, full and intelligent disassembly. This identifies data areas in the programs; these being displayed as a hex/ASCII dump. Operating system calls are labelled creating a very readable code. The powerful trace facilities enable program instructions and register contents to be traced to printer whilst the program is running. Indispensable for graphics programs as they can be stepped through whilst observing the effects on the screen.

SPY2 features a disc sector editor displaying the contents of a whole sector; disc search facilities for finding byte patterns or strings and free disc space. Files may be recovered by creating a directory entry with all the data concerning the deleted file. Directory entries can be easily amended using the *AMEND command. The *FORMAT command formats discs with any number of tracks. A verify command checks discs. The *REFORMAT command is extremely useful for recovering information from a bad track, reformatting it and restoring the data.

SPY2 is fully compatible with the 2nd processor.

The most comprehensive of all debugging/disc utility ROMs.

**Price £30 inc vat.**




## ASM

ASM provides all the superb features of the ADE macro assembler on its own ROM.

The program source file may be written using any editor (even Wordwise or View!). Complete reference manual and utility/macro library disc. Use the assembler that professional software writers use.

**Price £35 inc vat.**
Please specify 40 or 80T utility disc.

...MUSIC SYSTEM. Note the definite

advanced micro-based music system on the market. A powerful piece of software; ... The package

# Real Correspondence Quality Printer

# *PRICE BREAKTHROUGH*

## QUENDATA DWP 1120 DAISYWHEEL PRINTER

### A HOST OF USEFUL FEATURES INCLUDE:–

- Standard parallel/centronics interface
- 20 c.p.s. *(approx 200 words/minute)*
- Easily obtained Qume ribbons
- Uses Qume daisywheels *(many typefaces available)*
- 10, 12 and 15 pitch options
- Maximum paper width 13 inches
- 4 levels of hammer impression
- Comes complete with power lead, plug, ribbon, courier 10 wheel, manual and cover
- Tractor and cut sheet feeder available

TRADE PRICE £178.25 INC. VAT. REC. RETAIL PRICE £299.00.

**OUR PRICE £199. NOW £149.00**
Inclusive of VAT & POST *(UK mainland only)*

**ORDER NOW WHILE STOCKS LAST**

Free to callers only *(with printer purchase)*. BBC printer lead and view driver

All major credit cards accepted.

Telephone orders: Gerrards Cross (0753) 889010

# SOFTSHOP LTD

**55 ST. PETERS COURT, CHALFONT ST. PETER, BUCKS SL9 9QQ**

AA119

ONLY £39.99 inc

FOR BBC MICRO MODELS A & B

# Introducing the Cirkit PRESTEL LINK

**Enter the world of Data Communications with the remarkable low cost Cirkit Prestel Link. A complete package for the BBC Model A or B, consisting of Modem, Software, connection lead and full instructions for only £39.99.**

## The Modem

Proven, reliable, acoustically coupled Modem with full BT approval.
Flexible coupling to fit standard BT phones (not trim phone type).
Battery powered for portable operation.
Typical battery life in excess of 40 hours, LED power and low battery indication.
Baud rates supported; 1200/75 full duplex for access to Prestel, BT Gold, Bulletin Boards etc. also 1200/1200 half duplex.
Supplied with Manual and connection lead to the BBC Micro Model A or B.

## The Software

Based on the renowned Commstar package this powerful ROM based software allows full access to Prestel and other Viewdata data bases.
Features include;
Full Prestel colour graphics with double height and flashing characters.
Pages accessed using normal Prestel key sequences.
Full program download capability to allow many free programs from Micronet 800 to be copied down to your computer.
Pages may be "marked" for later retrieval and display, or alternatively may be copied and saved to file.

## Up-grade

In addition to the basic "Prestel" a software up-grade is also available which will allow full access to BT Gold and many other Bulletin boards and data bases. This "Terminal Mode" program allows text files to be sent or received (at 1200/75 baud) and stored in buffer or saved to disc. This ROM may be ordered with the basic Prestel Link or at a later date. Price **£15.99** inc.

**To order just send £39.99 (inc. VAT and p&p) for the BBC Prestel Link or £55.98 (inc. VAT and p&p) for the Prestel Link and enhanced software to the address below, or phone using your Access or Barclaycard. Please allow 14 days for delivery.**

AA171

Access

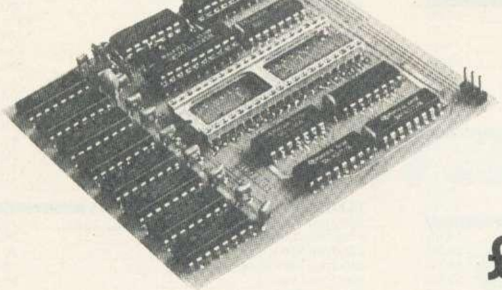
## Cirkit Distribution Limited

**Park Lane, Broxbourne, Herts EN10 7NQ. Tel: (0992) 444111. Tlx: 22478**

VISA

# 256K RAM

An exciting new memory expansion card from PALESAR, giving your BBC Model B the memory of a 128K Model B Plus, and then some!



**£99**

incl. VAT and postage

Professionally designed and built, this compact 256K dynamic RAM card plugs into the 6502 processor socket. With just three wires to plug onto link pins, it is as easily installed as a sideways ROM. Absolutely no soldering, or connections to I.C. legs.

- Eight 16K sideways RAM banks, from 8000 to BFFF
- Four 32K shadow RAM banks, from 0000 to 7FFF
- Leaves the whole of BBC RAM free for buffers, screen memory, ROM workspace, etc.
- Facilities for four totally independent programs, each 31K long, to be simultaneously resident in memory.
- Supplied with comprehensive manual, and Manager ROM, containing * commands to comprehensively test the RAM on installation, and load, save and catalogue sideways RAM's.

Cheques and P.O.'s to:

Palesar P.O. Box 49 Newbury RG14 7AZ (0635) 34980

Technical: 7 - 10 p.m.

# LOOK OUT

## FOR THE MOST AMAZING ADVENTURE GENERATING PROGRAM EVER

## THE GRAPHIC ADVENTURE CREATOR

## COMING SOON ON THE BBC B

Incentive Software Ltd.
54 London Street, Reading RG1 4SQ. Tel.(0734) 591678

# MICROMAN Computers

## ACORN SPECIALIST COMPUTER CENTRE

*All our prices include VAT.*

| | |
|---|---|
| **THE NEW BBC MASTER SERIES** | |
| **MASTER 128** | **499.00** |
| **MASTER Turbo Upgrade** | **125.00** |
| **MASTER ET** | **399.00** |
| **MASTER 512 Upgrade** | **T.B.A.** |
| **MASTER SC Upgrade** | **T.B.A.** |

***For technical information and specification please phone or call into our shop.***

| | |
|---|---|
| **ACORN PERIPHERALS & UPGRADES** | |
| Teletext Receiver | 149.00 |
| Prestel Receiver | 139.00 |
| 6502 2nd Processor | 199.00 |
| Z80 2nd Procesor | 399.00 |
| IEEE Interface | 325.00 |
| Acorn 10MB Hard Disc + Level 3 | 1699.00 |
| Acorn 30MB Hard Disc + Level 3 | 2499.00 |
| BBC B Plus Upgrade 64-128K | 39.95 |
| ADFS Upgrade | 30.00 |
| 1770 Upgrade | 49.95 |
| Acorn DNFS Disc Upgrade | 99.00 |
| **RAM/ROM EXPANSION BOARDS** | |
| A-B Upgrade | 95.00 |
| ATPL Sidewise ROM Board | 43.70 |
| ATPL Sidewise ROM Board/B Plus | 29.95 |
| Aries B32 RAM Expansion Board | 92.00 |
| Aries B12 ROM Board | 46.00 |
| Aries B12c | 5.75 |
| Computer Village ROM Board | 49.00 |
| **SOLIDISK PRODUCTS** | |
| Solidisk 32K Sideways RAM | 53.00 |
| Solidisk 64K Sideways RAM | 80.00 |
| Solidisk 128K Sideways RAM | 125.00 |
| Solidisk 256K Board | 175.00 |
| Solidisk DDFS 2.2 Interface | 45.00 |
| Solidisk ADFS 2.1 Interface | 55.00 |
| Solidisk CPU Case + Keyboard | 33.00 |
| Solidisk 32K-256K Upgrade service available | |
| **EPROM PROGRAMMERS-ERASERS-I/CS** | |
| Control Telemetry Eprom Prog. | 109.25 |
| Eprom Programmer | 20.95 |
| Eprom Programmer + ZIF Socket | 25.95 |
| Eprom Eraser | 20.95 |
| Eprom Eraser with Timer | 25.95 |
| Eproms 2764 8K Hitachi | 2.75 |
| Eproms 27128 16K Hitachi | 2.95 |
| 27128 per 5 Eproms | 12.50 |
| RAM 6264LP-15 8K | 3.95 |
| 27256 (21v) | 5.95 |
| **MONITORS (including cable):** | |
| Microvitec 1431 Standard | 229.00 |
| Microvitec 1451 Medium | 279.00 |
| Philips 1114 TV/Monitor/CV | 209.00 |
| Philips CMB8533 Med/RGB/CV | 299.00 |
| Philips Green 7502 | 85.00 |
| Philips Amber 7522 | 89.00 |

| | |
|---|---|
| **MODEMS/COMMUNICATIONS** | |
| **Pace Nightingale + Commstar** | **132.25** |

***Bulletin Board service for full details of Microman Computers latest prices, special offers, news and message service contact:***
**MORECAMBE BULLETIN BOARD**
**1200/75 (Commstar users: Filter off)**
**TELEPHONE 0524 426133**

| | |
|---|---|
| Pace AutoDial/AutoAnswer Board | 56.35 |
| Pace Auto Dial Utilities Disc | 11.50 |
| Pace OBBS Bulletin B Software | 25.00 |
| **DISC DRIVES** | |
| Pace PSD1 SS/40T/100K | 95.00 |
| Pace PSDIB (above in dual case) | 121.90 |
| Pace PSD3 DS/40T-80T/400K | 129.00 |
| Pace PSD3B (above in dual case) | 147.08 |
| Pace PDD3 DS/40T-80T/800K | 244.95 |
| Cumana CSX100 SS/40T/100K | 99.00 |
| Cumana CSX400 DS/40T-80T/400K | 134.95 |
| Cumana CSX800 DS/40T-80T/800K | 244.95 |
| Pace PSD1P SS/40T/100K | 129.95 |
| Pace PSD3P DS/40T-80T/400K | 157.55 |
| Pace PSD3PB (above in dual case) | 174.80 |
| Pace PDD3P DS/40T-80T/800K | 289.80 |
| Cumana CS100 SS/40T/100K | 129.95 |
| Cumana CS400 DS/40T-80T/400K | 159.95 |
| Cumana CD800S DS/40T-80T/800K | 289.95 |
| Pace Power Supply | 44.85 |
| Opus Challenger | 249.95 |
| RAM Disc Upgrade to 512K | 49.95 |
| Mr Floppy 5.25" DS/DD/80T (10) | 16.50 |
| WABASH 5.25" DS/DD/80T (10) | 16.50 |
| **AMX MOUSE** | |
| AMX Mouse inc SUPER ART | 89.95 |
| AMX Desk | 24.95 |
| AMX Utilities | 14.95 |
| AMX Paintpot | 14.95 |
| AMX Super Art ROM | 49.95 |
| AMX Pagemaker | 49.95 |
| AMX 3D Zicon | 24.95 |
| AMX Database | 24.95 |
| AMX Xam | 24.95 |
| **PRINTERS** | |
| Canon PW1080A + BBC Cable | 289.00 |
| **TAXAN KAGA KP810 + BBC Cable** | |
| **Phone for latest price** | |
| Canon PW-1156A | 459.00 |
| Canon PJ1080A Colour | 573.85 |
| Star SG10 | 259.00 |
| Star SG15 | 389.00 |
| Quandata Daiseywheel | 199.00 |
| Juki 6100 Daiseywheel | 379.00 |
| Epson LX80 NLQ | 258.75 |
| **JOYSTICKS** | |
| Voltmace 14b Handset | 14.95 |
| Voltmace 3b Singlet | 12.95 |
| Voltmace 3b Dualset | 19.95 |
| Voltmace 14b Interface | 14.95 |
| Voltmace Driver Cassette | 5.95 |
| Voltmace Datapad Keyboard | 39.95 |
| **WORD-PROCESSORS** | |
| View 2.1 ROM | 52.00 |
| View 3.0 ROM | 79.00 |
| View Printer Driver Generator | 11.50 |
| View Index | 14.95 |
| Wordwise ROM | 44.85 |
| Wordwise Plus ROM | 49.00 |
| HI-WORDWISE (DISC) | 6.00 |
| Wordease (Disc) (Wordwise + Utls) | 21.00 |
| Spellcheck III ROM (View & WW) | 35.99 |
| Merlin Scribe ROM | 59.95 |
| Edword 2 ROM | 52.84 |
| **DATABASES** | |
| Viewstore ROM | 52.00 |
| Acorn Database (Disc) | 15.35 |
| Gemini Datagem ROM | 79.95 |
| Merlin Database ROM | 49.00 |
| Star Database ROM | 75.00 |
| Masterfile II (Disc) | 22.00 |
| Betabase | 25.00 |
| Betabase Utilities | 12.00 |
| **SPREADSHEETS/CHARTS** | |
| Viewsheet ROM | 52.00 |
| Ultracalc ROM | 79.50 |
| Intersheet ROM | 49.95 |
| Hi-Intersheet (Disc) | 6.00 |
| Interchart ROM | 33.95 |
| **LANGUAGES** | |
| BCPL ROM | 59.80 |
| BCPL Calculations (Disc) | 34.50 |
| BCPL Stand Alone Gen. (Disc) | 49.90 |
| ISO Pascal ROM | 59.95 |
| ISO Pascal Stand Alone Gen. | 34.50 |
| Comal ROM | 49.85 |
| Acorn LOGO ROM | 69.00 |
| Open LOGO ROM | 69.95 |
| Logotron LOGO ROM | 69.00 |
| Micro-Prolong ROM | 79.95 |
| Microtext (Disc) | 59.80 |
| Acorn Forth ROM | 49.85 |
| 6502 Development System (Disc) | 49.85 |
| Acorn Turtle Graphics (Disc) | 19.89 |
| Acorn Lisp ROM | 49.85 |
| **UTILITIES** | |
| Acorn Basic Editor | 29.90 |
| Acorn Termulator ROM | 34.50 |
| Acorn Graphics Ext. ROM | 29.90 |
| Disc Doctor ROM | 33.35 |
| Printmaster ROM | 33.35 |
| Termi II ROM | 33.35 |
| Accelerator ROM | 64.40 |
| Graphics ROM | 33.35 |
| System ADE ROM | 60.00 |
| System SPY ROM | 30.00 |
| Romit ROM | 34.00 |
| Iconmaster ROM | 34.01 |
| Sleuth ROM | 32.00 |
| Toolkit Plus ROM | 39.00 |
| Exmon II ROM | 32.00 |
| Help II ROM | 31.00 |
| Discmaster (Disc) | 21.00 |
| Dumpmaster II ROM | 31.00 |
| Slave Plus ROM | 39.95 |
| Floppywise Plus ROM | 29.95 |
| Vine Replay ROM | 34.99 |
| Hershey Font (Disc) | 21.00 |
| Fontwise (Disc) | 12.00 |
| Fontaid ROM | 30.00 |
| Fontaid Utilities (Disc) | 15.00 |
| Jukit (6100) ROM | 25.00 |
| Acorn Speech Synthesizer | 55.00 |
| Acorn Creative Sound (Disc) | 19.95 |
| Computer Concepts Speech ROM | 33.35 |
| Superior Soft Speech (Disc) | 11.95 |
| Beebug Studio 8 (Disc) | 22.00 |
| Island Music System (Disc) | 29.95 |

**CAD SYSTEMS & PLOTTERS**

*Microman have opened a new CAD centre offering full demonstration facilities for the ROBOCOM BITSTICK I & II SYSTEM for the BBC Computer and ROBOCAD & PCB DESIGNER for the FERRANTI PC Computer. We stock a comprehensive range of plotters, including WATANABE, HITACHI, EPSON, PLOTMATE, PENMAN and are main dealers for the ROLAND range of plotters.*

| | |
|---|---|
| Bitstik 1 | 375.00 |
| Bitstik Multi-plotter Driver | 79.00 |
| Bitstik 2 | 914.25 |
| Bitstik 2 Upgrade | 517.50 |
| Roland DXY-880 A3 Plotter | 943.00 |
| Roland DXY-980 A3 Plotter | 1380.00 |
| Roland DPX-2000 A2 Plotter | 4370.00 |
| Watanabe A3 Plotter (6 pen) | 1148.85 |
| Epson HI80 Plotter (4 pen) | 458.85 |
| Hitachi A3 Plotter (4 pen) | 569.25 |
| Linear Graphics Plotmate | 343.85 |
| Penman Plotter | 228.85 |
| Penman Micad Special Pack | 249.00 |
| Penman Utilities Special Pack | 249.00 |
| Trackerball RB2 + ICON software | 69.95 |
| NOVOCAD Package | 90.85 |
| NOVOCAD (Trackerball compatible) | 113.85 |
| Plotter Utility Program | 32.78 |
| **ELECTRON COMPUTER/PERIPHERALS** | |
| Electron + Five Pack | 79.00 |
| Plus One Interface | 59.95 |
| Electron View | 29.95 |
| Electron Viewsheet | 29.95 |
| Electron Logo | 59.80 |
| Electron ISO Pascal | 59.80 |
| Cumana Disc Interface | 74.95 |
| Pace Modem + Commstar | 159.85 |

## MAIL ORDER SALES

Access

**PHONE 074488 5295**

VISA

We accept both Access & Visa credit cards. Simply telephone your order, giving card number, address and expiry date, or send your order with cheque or postal order to our above address.

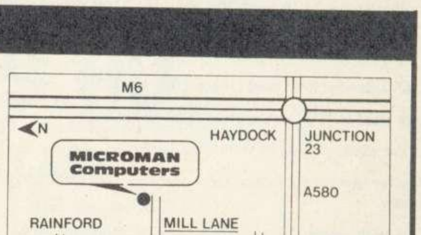
*Carriage/Postage Charges:* Computers/Printers/Disc Drives: Next day delivery, £8.00; ROMS/Exp. Boards/Software: First class post, £1.00; Books: First class post, £1.50.

*All our prices include VAT.*

## SHOP

Open 9-6 Monday to Saturday. All our prices include VAT. Educational, Industrial & Government orders accepted. Export enquiries welcome.

**Rainford Industrial Estate,**
**Mill Lane, Rainford,**
**St. Helens, Merseyside.**
**Phone 074488 5242**



Gemini

# GEMINI LAUNCH NEWSPAPER FOR BBC MICRO USERS

***Watch this Space***

AA170

# Gemini SUPER SOFTWARE

## DATA Gem



**The Definitive Random Access, 24K ROM based Database Management System for the BBC B and BBC B+.**
Long hailed as the most comprehensive and powerful database for the BBC, and now becoming a legend in its own right. DataGem has been significantly reduced in price now that development costs have been recovered by Gemini. Whether you have a single 40 track drive or a Winchester hard disk, this system will make use of ALL your disk space, treating up to 4 drive surfaces as ONE CONTINUOUS FILE. Much has been made and exploited of DataGem's superb selective searching capability, and together with its unmatched mathematical powers, the system provides a really professional database for use in the home, office or school that will harness the full power and potential of the BBC micro.

**Massive Saving ONLY £79.95**

## DATAGEM OWNER'S MANUAL
Available separately at (inclusive) **£12.95**

## L.B.O. LIFE & BUSINESS ORGANISER

***THE ULTIMATE BBC UTILITY***
Also available on DISC for those with a cluttered ROM BOARD. QL version also available now, MS-DOS version early 1986.
**ONLY £19.95**

## DDD SUITE

**THE REVOLUTIONARY 'TRIPLE-D' BBC DISK INTEGRATED SOFTWARE SYSTEM**

- **DDD BASE** ONLY **£29.95**
- **DDD CALC** ONLY **£29.95**
- **DDD PLOT** ONLY **£29.95**

**COMBO PACK All 3 modules £69.95**

## MONEY MANAGEMENT

### GEMINI – BEST SELLER
This program is designed for disk users. It allows individual transactions to be stored and retrieved in respect of up to 5 separate BankBuilding Society/Investment accounts AND up to 5 Credit card/loan/Mortgage accounts.
**ONLY £12.95**

## ORDER NOW

**24 HOURS CREDIT CARD HOTLINE (4 lines) 0395-265 165**

All prices EXCEPT HARDWARE include VAT and post/packing
To: Gemini Marketing Ltd., Gemini House, EXMOUTH EX8 4RS

Please supply ____________

Name ____________

Address ____________

____________

Cheque/POs value £______ enclosed, or please debit my Access/Amex no.

Signature ____________

Export/Trade enquiries and Local Authority POs welcome.

☐ Please send me your latest software/hardware price list.

## OFFICE MASTER



CASHBOOK/
FINAL ACCOUNTS
MAILIST/EASILEDGER
INVOICE/STATEMENTS
STOCK CONTROL

**£25** CASSETTE OR DISK

## OFFICE MATE

DATABASE
GRAPH PLOT
BEEBCALC-SPREADSHEET
WORD PROCESSOR

**£12** CASSETTE OR DISK

### DATAGEM/WORDWISE PLUS MAILMERGE
With all documentation, or just **£9.95** when purchased together with Wordwise Plus. **£19.95**

### WORDWISE PLUS
The first competitor's software we have ever stocked. In our view, simply the best word processor you can buy for the BBC. Recommended for DataGem owners who may purchase MAILMERGE at **£9.95** when ordering WW+. **£49.95**

### DATAGEM/WORDWISE PLUS MAILMERGE BUNDLES PACKAGE
Ideal package for the disk user requiring a powerful database, word processor and mail merging facilities. ALL 3 – **£129.95**

### GEMINI STAND-ALONE PAYROLL (Non-integrated)
A long-standing and best-selling Gemini business package providing all the necessary facilities for calculation of payrolls of up to 40 employees. **£39.95**

### DISK-BASED MAILING LIST
An absolute must for disk users, this powerful mailist uses random filing for the storage and manipulation of up to 2000 names and addresses per file. **£24.95**

### 'PROTECTOR' ROM
This ROM is designed to make confidential disk data secure, and unavailable to those without the required password. It should be considered by all who are using and storing data of a confidential nature. **£24.95**

### VERTICAL MARKET PACKAGES
Hotel front desk and billing Insurance/mortgage broker/ Estate agent. Please enquire for details.

### SSP PACKAGE – STATUTORY SICK PAY
This business software has been designed with the prime objective of providing the end-user with a total package which meets the new and complicated SSP requirements due to come into force with effect from 6th April 1986. **£39.95**

## INTEGRATED ACCOUNTING FOR DISK USERS.

### WHY INTEGRATED ACCOUNTING?
Designed for the small to medium sized business user, where speed and efficiency are vital.
Because it will retrieve information stored in one program for use by another, and store data in one program which has been generated by another.
This means that the scope for human transposition error is virtually eliminated.

**NEW LOW PRICE**

- **INVOICING & SALES LEDGER £69.95**
- **STOCK CONTROL £69.95**
- **PURCHASE LEDGER £69.95**
- **NOMINAL LEDGER £69.95**
- **PAY ROLL £69.95**



**PRICE PER MODULE £69.95**
Includes 1 year software support.

Information correct at time of print.

# Gemini SUPER HARDWARE

BBC B + Micro 64K + DFS £365
BBC B + Micro 128K + DFS £389
BBC B + 64K + Econet No DFS £359
BBC B + 64K + DFS + Econet £389
64K Upgrade Kit for B + £32
BBC MASTER 128K Micro £433
BBC MASTER TURBO 4MHz £544
ECONET UPGRADES Available
6502 Acorn 2nd Processor package £165
Z80 Acorn 2nd Processor package £319
TORCH Z80 Card + Perfect Software £199
Acorn IEEE Interface Complete £280
Acorn Teletext Adaptor £125
Acorn Prestel Receiver £115
Acorn Bitstick I £299
Robocom Bitstick II £759
Upgrade for B1 to B2 £450
Bitstick Multiplotter Driver £65
Dust Cover for BBC Micro £3.50
Epson LX-80 Printer £194
Tractor Feed Attachment £20
Single Sheet Feeder £49

**VARIOUS PRINTERS**
EPSON GX80 £187
EPSON RX100 £342
EPSON FX80 Printer £259
EPSON FX85 Printer £315
EPSON FX105 Printer £435
EPSON JX-80 Colour Printer £450
EPSON Hi-80 Printer Plotter £319
EPSON Paper Roll Holder £17
FX80 tractor attachment £37
SEIKOSHA GP50A & GP50S £69
Centronics Printer Cable to interface all the above Printers to BBC £6
(Securicor carriage charge on printers £7)

**RX & FX PRINTER INTERFACES**
RS232 £25 RS232 + 2K Buffer £55
IEEE 438 £62

**CENTRONICS GLP Brother M1009 (NLQ) Printers**
Special Offer £107
Tractor Feed Attachment £9
NLQ Designer ROM £20
Individual FONT ROM £14

Brother HR-15 only £285
Single Sheet Feeder £185
Electronic Keyboard £135
Tractor Feed Attachment £84
Ribbon Cartridges:
Fabric £3
Carbon £3
Multistrike £5
Daisywheels (various typefaces) £18
Brother HR10 only £199

**PRINTER SHARERS**
Connect 3 BBC Micros to 1 Printer £65
Connect 6 BBC Micros to 1 Printer £129
(Cables extra)
Kaga KP810 NLQ Printer £185
Kaga RS232 Interface £49
Kaga RS232 Interface + 2K Buffer £69
Kaga RS232 Interface + 16K Buffer £95
Kaga KP910 Printer £339

**PRINTER LEAD**
Standard length (4 feet long) £6
Extra long (6 feet long) £8

**PRINTER RIBBONS & VARIOUS DUST COVERS**

| Type | Ribbons | Dust Covers |
|---|---|---|
| FX100 | £10.00 | £5.25 |
| FX80/MX80 | £4.50 | £4.95 |
| RX80 | £4.50 | £4.50 |
| LX80 | £4.00 | £4.50 |
| GP80/GP100 | £4.50 | £4.00 |
| GP250 | £5.95 | £3.95 |
| Centronics GLP | £4.00 | £3.75 |
| KAGA KP810 | £5.25 | £4.75 |
| CANON PW1080 | £5.25 | £4.75 |
| Microvitec Metal Monitors | | £5.50 |

**LISTING PAPER (PERFORATED)**
1,000 Sheets 9½″ Fanfold Paper £7
2,000 Sheets 9½″ Fanfold Paper £13
1,000 Sheets 15″ Fanfold Paper £9
Teleprinter Roll (Econo Paper) £4

**PRINTER LABELS**
**(On continuous fanfold backing sheet)**
1,000 90x36mm (Single Row)
1,000 90x36mm (Twin Row)
1,000 90x49mm (Twin Row)
1,000 102x36mm (Twin Row)

**MICROVITEC 14″**
1431 – Medium resolution as used on the BBC television computer programme £179
1451 – High resolution, suitable for word processing in mode 0 £225
1441 – High res, exceeds the capabilities of the BBC micro £385
1431AP RGB + PAL and AUDIO £199
1451AP RGB + PAL and AUDIO £269
Dust Cover for Microvitecs £5.50

**KAGA/TAXAN 12″**
KAGA KX1201G Hi-res Green Monitor £90
KAGA KX1202G Ultra-Hi-Res Green Monitor £105
KAGA KX1203A Ultra-Hi-Res Amber Monitor £105
KAGA Vision 2, Hi-Res, RGB Colour Monitor £210
KAGA Vision 3, Ultra Hi-Res, RGB Colour; Text mode switch allows monochrome text display in either Green/Amber or White reverse £330
PHILIPS 12″ Hi-Res Amber Monitor £73

**FIDELITY COLOUR MONITOR**
Medium Resolution, attractively finished, 14″ RGB and Composite VIDEO/AUDIO Input. Has a detachable anti-glare screen. £169

**ZENITH**
**"Test Bureau Recommended for use in Education".**
Green (New Design) Hi-res £72
Amber (New Design) Hi-res £76

**LEADS**
BNC lead for Zenith or Philips £3
RGB lead for KAGA £3

**SWIVEL BASES for Video Monitors**
For 12″ Monitors £14
For 14″ Monitors £16
The Epson RX/FX/KAGA Printer Commands Revealed £5.95
Mark II Light Pen £25
Copy Holders:
Desk Top £10
Angle poise £17

**QUALITY DISC DRIVES SUBJECT AVAILABILITY**

| Capacity | Drives without P.S.U. | | Drives with P.S.U. | |
|---|---|---|---|---|
| | Single | Twin | Single | Twin |
| 100K (180K) | CLS 100 £75 | | CS 100 £110 | |
| 200K (360K) | CLS 200 £91 | CLD200 £169 | CS 200 £110 | CD200 £185 |
| 400K (720K) | CLS 400 £96 / £98 CLS400S | CLD 400 £169 | CS 400 £115 / £117 CS 400S | CD400 £182 |
| 800K (1.44M) | | CLD800 £181 / £183 CLD 800S | | CD 800 £197 / £199 CD 800S |

TWIN Disc Drive Case, complete with Power Supply & Cables £35
Securicor carriage on Disc Drives £6

*Prefix* **C** = *Cased Drive* **L** = *Less PSU*
**S** = *Single* **D** = *Double*
*Suffix* **S** = *40/80 Switchable*

**LOCKABLE DISC STORAGE UNITS**
M35 – holds upto 40 discs £9
M85 – holds upto 95 discs £12

**PLASTIC LIBRARY CASES**
For 5¼″ Disc Storage – holds 10 Discs £1.80
Floppy Head Cleaner Kit £8

**Dust Covers (For our Disc Drives)**
Single (without PSU) £3.20
Single (with PSU) £3.95
Twin (without PSU) £3.85
Twin (with PSU) £3.90
Epson NLQ Rom for the BBC Micro £25
View Printer Driver for NLQ ROM £7.00

**DUMPOUT 3**
A highly sophisticated screen dump ROM. Designed for use with the following printers: CP80, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, LPVII, NEC PC8023, DMP100/200/400, Mannesman Tally etc.
Price including comprehensive manual. £25
Rom Manager £18
Beebfont Rom £25

**Beeb Printer Rom**
Commands select the options for the following printers: GP100, STAR, NEC, MX/FX, KAGA, LP/VII/DMP100, DMP200. £25
Transferom (Tape to Disc Utility) £25.00

**LE MODEM**
PROHIBITED from direct or indirect connection to any telecommunication system run by British Telecommunications. Action may be taken against anyone so connecting this apparatus.
The Modem from Gemini £89
(Price includes Software ROM, Cables and Manual)
Nightingale Modem £119
Nightingale Modem without software only £99
Commstar Rom package only £29
Auto Dial/Auto Answer Board £48
Auto Dial Utilities Disc £9.50
OBBS Bulletin Software £20.00

**THE AMX MOUSE**
Simply the best. Now supplied with the new superart Software ROM & Disc at no extra cost. £65
Beeb Speech Synthesiser special price £32
Eprom Programmer special offer £69

**TEX EPROM ERASERS**
Eraser EB–Standard version erases up to 16 chips. £28
Eraser GT – Deluxe version erases up to 28 chips. Has automatic safety cut-off to switch off the UV lamp when opened. £30
Spare UV tubes £9

**Beeb Video Digitiser**
Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied. £99
Magazine Maker £125.00

**VOLTMACE JOYSTICKS**
Delta 3B Single Joystick £10
Delta 3B Twin Joysticks £16
Delta 14B Single Joystick £12
Delta 14B/1 Adaptor Module £12
Transfer Software Disc/Tape £7
Rom Extraction Tool £2
**Surge Protector Plug Protection for only** £9.50
Replacement Flexible Keyboard Connector £4
Attache Carrying Case for BBC Micro £13
Data Cable £2.00
Data Cassettes:
cases 35p each; 10 for £3.20

**SPARES FOR BBC MICRO**
Keyboard £46 Keystrip £2
Power Supply £45 Case £25
UHF Modulator £4 Speaker £2
Speaker Grill £1 Keyswitch £2
8-way Dip Switch £0.85

**CONNECTING LEADS**
CASSETTE LEADS 7 pin DIN Plug
to 5 pin DIN Plug + 1 Jack Plug £2.00
to 3 pin DIN Plug + 1 Jack Plug £2.00
to 7 pin DIN Plug £2.50
to 3 Jack Plugs £2.00
6 pin DIN to 6 pin DIN Plug (RGB) £2.50
Disc Drive Power Leads: Single £3.00 Dual £3.75
Disc Drive Interface Leads: Single £4 Twin £6

**PLINTHS FOR BBC MICRO AND PRINTERS**
Single BBC Plinth £11
Double BBC Plinth £20
Printer Plinth £10
4 Way Mains Distribution Socket £9.99
Acorn Music 500 £72
28 pir ZIF SOCKET (Textool) £6.95
28 pin Dil Header Plug:
Solder type £1.50
IDC Crimp type £1.95

# ORDER NOW
## 0395-265 165

**Post to:** Gemini Marketing Limited, 'Gemini House', Dinan Way, Exmouth, EX8 4RS.
Please send me further information ☐
Name__________
Address__________
Post code __________
Your Credit Card No. __________
Please supply __________

**24 HOURS CREDIT CARD HOTLINE 0395-265165 (4 lines)**


THREE GAMES IN ONE—ESPECIALLY FOR THE BBC MICRO
Discover a new spectrum of enjoyment on your BBC computer.
Three fantastic Spectrum games are now available in one package especially for the BBC micro-computer!
Features:
ALIEN EIGHT
JET-PACK
AND
PREVIOUSLY UNRELEASED ON THE BBC – LUNAR JET MAN
CASSETTE £9.95
Ultimate Play The Game products are available from W H Smith, John Menzies, Woolworth and all good software retail outlets.
ULTIMATE PLAY THE GAME
Copies may also be obtained from Ultimate Play The Game, The Green, Ashby-de-la-Zouch, Leicestershire LE6 5JU. Telephone 0530-411485.




## CANON PW-1080A OR KAGA TAXAN KP810

**NEAR LETTER QUALITY PRINTER**

NLQ Mode 23 × 18 Matrix: 27 cps
Draft Mode 11 × 9 Matrix: 160 cps
Full range of Epson FX 80 Print Codes
Friction & Tractor Feed
Centronics Interface Standard
CANON PW-1156A Available
(Accepts 17" Paper)

CANON PW-1080A + VAT
CANON PW-1156A + VAT

PHONE FOR NEW LOWER PRICES

See below for Printerpack prices

## JUKI SPECIAL NOW FROM £329 inc. VAT.

RING FOR DETAILS.




## C.J.E. MICRO'S BBC PRINTERPACKS

For Star, Canon & Juki Printers include:

1. The Printer
2. Next Working Day Delivery
3. Cable to the BBC 1.25 Metres
4. Screen Dump Program (M/C Source)
5. Text Dump Program
6. Function Key set up Program.
7. Function Key Label Printing Program.
8. VIEW Printer Driver
9. 100 Sheets of Paper
10. Mains Plug with 3 Amp Fuse
11. Booklet giving details of using the printer with a BBC
12. Character Defining Program for Downloadable-character-set (draft mode)

**CANON PW-1080A** **BBC PRINTER PACK £ inc VAT**
**CANON PW-1156A** **BBC PRINTER PACK**
**JUKI 6100** **BBC PRINTER PACK**
**STAR SG10** **BBC PRINTER PACK £295 inc**

PHONE FOR NEW LOWER PRICES

**Low Prices**

**OFFICIAL ACORN APPROVED DEALER**

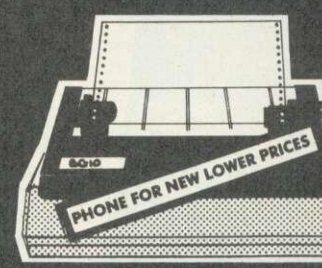
## JUKI 6100

One Year Warranty
20 CPS: BiDirectional & Logic Seeking
10, 12, 15 & Proportional Spacing
Wordstar Compatible
2K Buffer; 13 Inch Platen
Underline; Backspace + Lots more
Centronics Interface Standard
RS 232 Interface £54.00 + VAT Extra
Tractor Feed £119 + VAT Extra
Single Sheet Feeder £199 + VAT Extra

**JUKI 6100 £330.43 + VAT = ~~£380.00~~**

See left for Printerpack prices

RING FOR SAMPLE PRINTOUT, FULL SPECIFICATIONS & LATEST PRICES




## STAR SG10

**NEAR LETTER QUALITY**

NLQ Mode 17 × 11 Matrix
True Descenders 9 × 9 Matrix
120 CPS Bidirectional & Logic Seeking
40, 48, 68, 80, 96, 136 cpl
Italics, Emphasized, Double strike
Super & Sub Scripts
Downloadable Character Set
Hi-Resolution & Block Graphics
Friction or Tractor Feed
10" Carriage
Centronics Interface Standard
RS232 Int. £58.00 + Vat Extra

See above for Printerpack prices

**STAR SG10 ~~£270.00~~ inc. VAT**

**Top Service**

## WIN A PORSCHE 924S when you buy a STAR SG10 from CJE

Written details on request.

## FONTAID

NLQ Designer for Canon and Taxan Kaga NLQ Printers.

Design your own NLQ fonts or 'download' one of our 20+ predefined fonts. The FONTAID disk includes the following type styles:
Square, Outline, Gothic, Computer Type Style, Bold, Shadow, and Broadway.

Additional Disk 'A' includes:
Greek/Maths, Script, Proportional Spacing, Plain, Handwriting and 2 styles of (Elite, Condensed, Super Condensed).

FONTAID requires 6264 RAM Chip in printer

**FONTAID (BBC)** .......... £30.00
**FONTAID (BBC) with 6264 RAM** .......... £36.00
**FONTAID Additional Disk 'A'** .......... £15.00

**Please state 40 or 80 track when ordering.**
**ROMS of individual fonts are available and can be used with any computer.**

**FONT ROMS** .......... £18.00 each
**P & P on FONTAID** .......... £1.00

Please phone for FONTAID leaflet and demonstration print out.

Coming Soon MULIT-FONT NLQ printing for Epson MX/RX/FX/LX and Epson compatibles.
Design your own font or use supplied predefined font.

Please phone for latest details.

**EXPORT ORDERS WELCOME**

VAT INCLUDED WHERE APPLICABLE
PHONE/CREDIT CARD ORDERS WELCOME
Postage 50p per order or as stated
Next day Delivery for Printers/Disk Drives £8.00
FULL RANGE OF CONNECTORS & CABLES AVAILABLE
PRICE LIST ON REQUEST

## CJE micros

Dept AU5, 78 Brighton Road, Worthing
W. Sussex BN11 2EN (0903) 213900

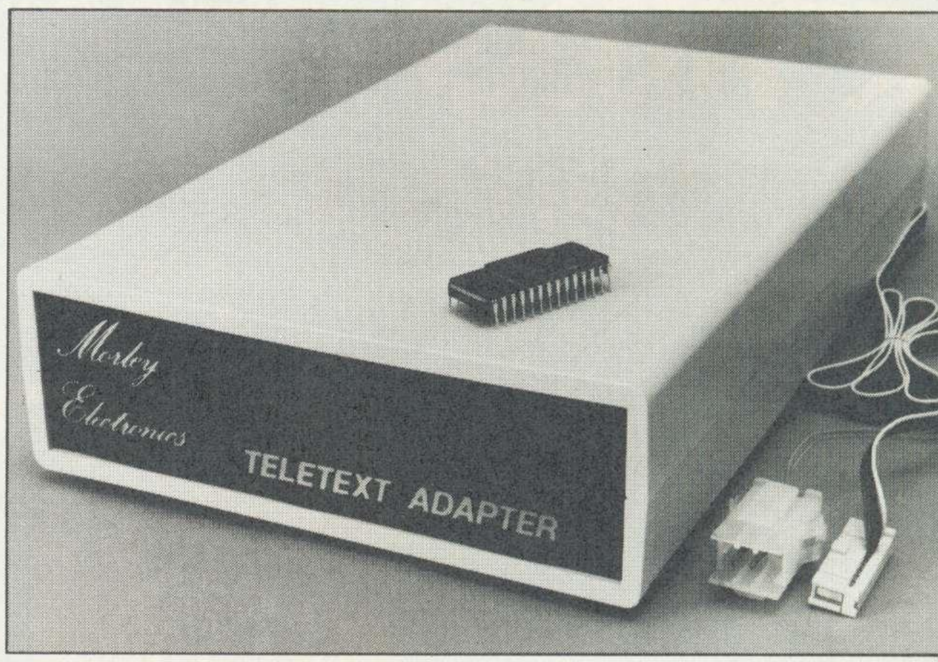
**NEW COLOUR JUKI NLQ PRINTER NOW IN STOCK £450.00 inc VAT**

Please phone for details

# RINT QUALITY

# MORLEY ELECTRONICS




## FEATURES

- Advanced design uses the latest technology will handle ANY future enhancements to the Teletext system eg: full field: 8 bit data transfer: 2k pages etc.
- Simply plugs into user port and power output.
- Low power consumption, less than 200ma. Optional power supply available.
- User friendly menu driven software including extended OSCLI and Osword commands for access from BASIC programs.
- No user-RAM required (PAGE remains at default value).
- FREE Telesoftware, no access charges. (at present updated weekly.)
- Save selected pages to disc/tape for later retrieval.
- Full access to all Teletext services and channels eg: CEEFAX, ORACLE, 4-TEL.
- Software available on ROM or sideways RAM format disc.
- Basic 1 & OS1.0 compatible.
- Gives you a real-time clock at your disposal (*TIME).
- Free software upgrades to allow for any enhancements to the teletext service. Eg: extra channels, full field data on cable & satellite systems etc.
- Easy to follow comprehensive user guide.
- No hardware limitations, it can for example receive virtually unlimited numbers of channels.
- Works with Solidisc SWR.
- Utils disc available including printer drivers allows pages to be selected and dumped direct to a printer (no more TV or Radio Times to buy).

### ELECTRON TELETEXT ADAPTER

Electron adapter now available, including emulated Mode 7 allowing you to run long Adventure type programs.

1 megabyte RAM disc configured as a drive. Should be available 2nd week of Jan. Please ring for details.

### M/B software DESIGN 7

Easily the best value Mode 7 screen designer on the market today.
Design any mode 7 screen, from simple MENU pages to full CEEFAX standard. This program is an invaluable aid. Designs can be saved to disc as automaticaly numbered files or the program will convert the screen into a BASIC Proc.

INTERFACES DIRECTLY WITH ADAPTER allowing CEEFAX-ORACLE pages to be selected and dropped into editor screen for alteration, saving, or conversion to BASIC. Allows channel change from within program.

The Morley Teletext adapter introduces you to the world of Teletext at a price that wont break the bank. Inside it you will find the latest in second generation Teletext chip technology, which unlike our rivals who are still using chips designed more than eight years ago, will be fully compatible with any future advances in the Teletext system.
With the Morley adapter you will get a unit that automatically tunes itself in to the required station (no more messing around with screwdrivers in the back of the case), a user friendly menu driven program available on rom or disc, easy to follow instructions and a 12 month warranty. Add to this the free downloadable telesoftware and we are sure that you will agree that we are offering you one of the best bargains on the market today.
For technical details please ring Morley Electronics on Tyneside (091) 262 7507
Please allow 28 days for delivery. N.B. Please note the teletext adaptor is not available without either ROM or sideways RAM software.

NOW AT NEW PREMISES

To order please fill in and send order form to: **MORLEY ELECTRONICS, UNIT 3 MAURICE ROAD INDUSTRIAL ESTATE, WALLSEND, TYNE & WEAR NE28 6BY. 091-262 7507**

AA35A

Please send me.

Qty. ☐ Morley Teletext adapters @ £74.45 inc. VAT & P&P.
Qty. ☐ Teletext software on Rom @ £24.95 inc. VAT & P&P.
Qty. ☐ Teletext software on Disc @ £23.95 inc. VAT & P&P.
Qty. ☐ M/B DESIGN7 screen designer @ £8.95 inc. VAT & P&P.
Qty. ☐ Teletext utilities on Disc @ £5.95 inc. VAT & P&P.
Qty. ☐ Optional PSU @ £9.95 inc. VAT & P&P.

Please delete 40/80

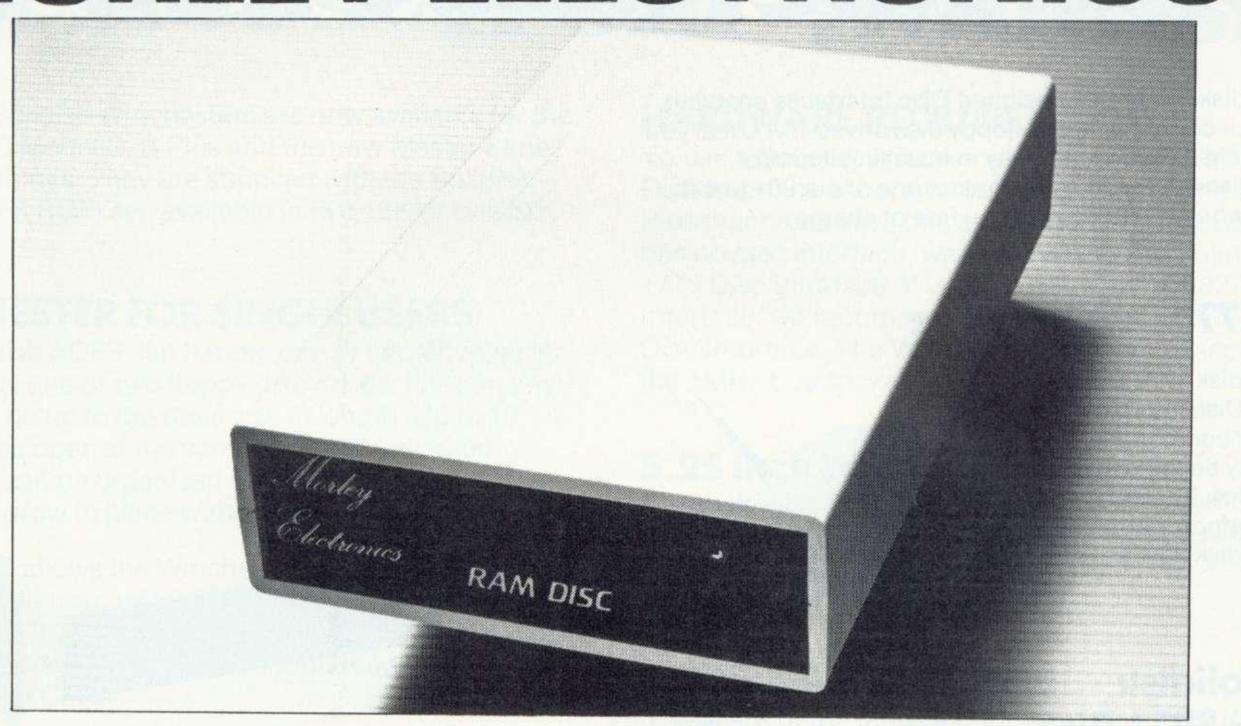
Total £

NAME ______ PHONE No. ______ CHEQUE No. ______

ADDRESS ______

______ POSTCODE ______

# MORLEY ELECTRONICS




Now available the first true MEGA capacity RAMdisc for the BBC or MASTER computers.
This fully compatible unit, currently available in either 1 or 2 megabyte versions comes complete with operating software on ROM, power supply, battery backup and a comprehensive user guide, add to this our usual 12 months no quibble guarantee and we're sure you'll agree Morley have done it again.

**FEATURES**
1 Megabyte of RAM connected to the 1 MHz bus.
Used with the supplied ROM software programs and files may be saved and loaded from the RAMdisc in the same manner as from a floppy disc with a large increase in speed, for example, a 20K mode 0 screen takes about 3-4 seconds to load from disc and about 0.2-0.3 seconds to load from the RAMdisc.
The RAMdisc ROM operates as a utility ROM working with the current filing system rather than as a separate filing system. Therefore ensures compatibility with any DFS.
The RAMdisc can be selected by a * command to take the place of any drive number from 0 to 9. If the RAMdisc replaces a floppy drive as 0 for example, all commands addressed to drive 0 will be intercepted by the RAMdisc. The default drive no. is 4.
'Dangerous' * commands such as *COMPACT, *COPY, *BACKUP etc are intercepted and the BBC's RAM from page 2 to &7FFF is saved to RAMdisc workspace, and may be recovered using a * command. This prevents accidental corruption of any programs/data in RAM you may have been using at the time. The save operation delays the * command by just under 0.4 seconds. The BBC's RAM can also be saved by an interrupt-driven routine which can be enabled by a * command.
The 'filing system wedge' ROM supplied supports load/save, byte file access, all relevant OSFSC commands, and contains a formatter, verifier and 'sector' editor for use with the RAMdisc.
Catalogue structure allows up to 2,709 files.

**APPLICATIONS**
Programs and ROMs can be written to take advantage of directly accessing a single RAMdisc, allowing the possibility of spreadsheets with more than 512 × 512 cells, million-character documents with immediate access and editing of any section, manipulation of 2 floating-point arrays each with 228 × 228 elements, a fast-access database with 10,000 100-character records, or even just a large printer buffer!
Accessible through the user's software for direct storage of eg: basic procedures, variables, large arrays etc which can be downloaded into the BBC's RAM or read directly. (We are hoping to be able to supply an extended basic ROM late this year, to allow 'transparent access' to the Ramdisc, which will effectively expand the BBC's RAM to about 1020k.)

**OPTIONAL SIDEWAYS RAM UTILITY (suitable for use with any 16k SWR)**
Sideways ROM images can be saved to the RAMdisc under a special directory which, when enabled, will be used when an unrecognised * command is trapped for the ROM to load sideways ROMs from disc into sideways RAM. The * command will then be passed to the new ROM image and if still unrecognised the next ROM will be loaded. If no ROM loaded from the RAMdisc intercepts the * command it will be passed to the current filing system as usual. ROMs on RAMdisc can be individually disabled in the same manner as 'real' ROMs in the BBC itself. Up to 104 8k ROMs can be saved onto the standard 1Mb RAMdisc, and the total load time (excluding time taken by the ROMs to process the command) for 100 ROMs is just under 9 seconds. All relevant control software for disabling/enabling ROMs etc. is provided. (Supplied on ROM.)

**EPROM PROGRAMMER** now available programs 8, 16 and 32k EPROMS connects to the user port software available on rom or disc.
Version 1 economy uncased with standard DIL socket.
Version 2 deluxe cased with ZIF socket.

**DESFAX 7** – Now you can run your own TELETEXT service! Incorporates the powerful editing facilities of DESIGN 7, again with Teletext adapter interfacing.
Stores up to 100 of your screen designs on a 40Tk disc or 200 on an 80Tk. Page selection by 3-digit number HOLD, REVEAL, page linking, individual page delays etc.
PLUS – a powerful CAROUSEL facility permits continuous slide-shows. Only one disc access for every 16 screens – reduces wear on drives. Smooth animation, variable speed text printing, built in printer dumps. Sample data disc and 22 page manual included. Beats all other systems for ease of use and versatility.

---

To order please fill in and send order form to: **MORLEY ELECTRONICS, Unit 3, Maurice Road Industrial Estate, Wallsend, Tyne and Wear NE28 6BY. Tel: (091) 262 7507**

Please send me:

| | |
|---|---|
| Qty. ☐ 1 Mbyte RAMdisc | @ £199.95 inc. VAT & P&P. |
| Qty. ☐ 2 Mbyte RAMdisc | @ £349.95 inc. VAT & P&P. |
| Qty. ☐ Utils ROM | @ £18.95 inc. VAT & P&P. |
| Qty. ☐ Eprom Programmer V.1 | @ £18.95 inc. VAT & P&P. |
| Qty. ☐ Eprom Programmer V.2 | @ £27.95 inc. VAT & P&P. |
| Qty. ☐ Desfax | @ 24.00 inc. VAT & P&P. |

Please delete 40/80     Total £

NAME ______ PHONE No. ______ CHEQUE No. ______

ADDRESS ______

______ POSTCODE ______

*Please allow 28 days for delivery*

# Disc Interfaces and Wi

Solidisk offers well designed Disc Interfaces enabling your computer to use floppy disc drives. If you feel you would have any difficulty in installing it and/or adding disc drives, you can contact one of our 90+ Local Experts who will install it for you free of charge.



## The 1770 Disc Interface

The Solidisk 1770 Double Density Disc Interface has only four components and can easily be fitted even by a novice. The 1770 Disc Interface is supplied with Solidisk 2.2 DFS ROM.

## The Solidisk 1770+8271 Disc Interface

If you already have a 8271 Disc Interface, then the Solidisk 1770+8271 Interface will give you the best of both worlds. You can select either the 8271 or the 1770 at a flick of a switch. The 1770+8271 Interface is supplied with the Solidisk DFS+ADFS ROM set. This is available in two 16K or one 32K ROM.

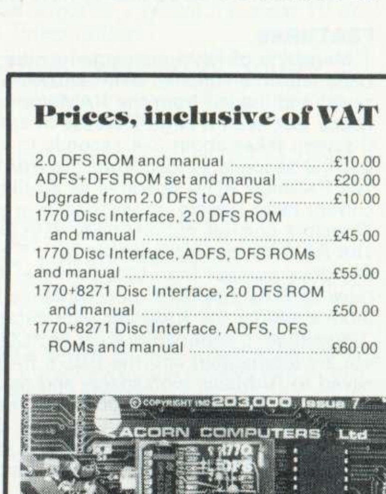
| Features built into ROM | DFS 2.2 | ADFS |
|---|---|---|
| Disc formatter | yes | yes |
| Disc verifier | yes | yes |
| Memory editor | yes | yes |
| Disc sector editor | yes | yes |
| Disc copier | yes | yes |
| Recover & Restore | yes | yes |
| Read track & Write track | yes | yes |
| Run 8271 floppy disc controller | yes | no |
| Osword 7F emulator for 1770 | yes | yes |
| Tape to disc | yes | yes |
| Download | yes | yes |
| DFS files to ADFS | no | yes |
| ADFS files to DFS | no | yes |
| 40/80 switching for 80-track drives | yes | only in DFS |
| Solidisk Winchester | no | yes |
| 6502, Z80 and 32016 compatible | yes | yes |
| Read & Write IBM-PC DOS discs | yes | yes |

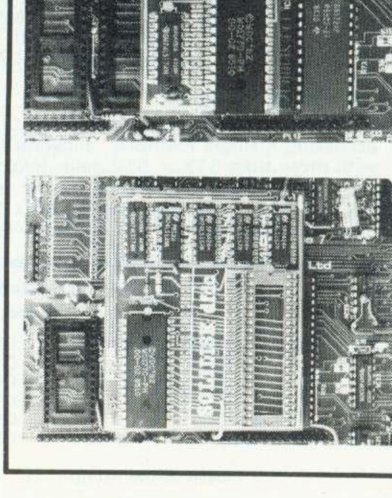
Both the DFS and ADFS have every facility that you would expect. They can run most protected software, such as Elite, Castle Quest, Island Logic's Music System etc. Other features include read after write, and the option of double density operation (with the 1770 chip) giving 60% extra storage capacity. Their compatibility with all Acorn Second Processors (6502, Z80 and 32016) and Econet File Server (Level 2), and their capability of reading from and writing to IBM-PC DOS diskettes (with the 1770 chip) reflect the broad range of applications supported. Both 1770 and 1770+8271 Disc Interfaces are compatible with Acorn 1770 DNFS and ADFS ROMs.

**The DFS and ADFS ROMs can be used to enhance both standard Acorn 8271 or 1770 Disc Interfaces, on the BBC Model B or the B Plus.**

### Prices, inclusive of VAT

| | |
|---|---|
| 2.0 DFS ROM and manual | £10.00 |
| ADFS+DFS ROM set and manual | £20.00 |
| Upgrade from 2.0 DFS to ADFS | £10.00 |
| 1770 Disc Interface, 2.0 DFS ROM and manual | £45.00 |
| 1770 Disc Interface, ADFS, DFS ROMs and manual | £55.00 |
| 1770+8271 Disc Interface, 2.0 DFS ROM and manual | £50.00 |
| 1770+8271 Disc Interface, ADFS, DFS ROMs and manual | £60.00 |



Solidisk Technology Ltd 17 Sweyne Avenue, Southend SS2 6JQ

# Winchesters from Solidisk

The Solidisk Winchesters are now available for the BBC Model B, B Plus and the new Master Series machines. They are supplied with the Solidisk DFS+ADFS ROM set, available in two 16K or one 32K ROM.

## WINCHESTER FOR SINGLE USERS

The Solidisk ADFS can handle one or two Winchester drives plus one or two floppy disc drives. Files on any drive can be up to the drive size in length. Up to 10 files can be open at the same time and unlimited numbers can be organised in a multi-level catalogue. Files can grow in place without risk of "Can't extend".

The ADFS allows the Winchester to be "partitioned" into multiple user areas, accessed by CP/M (Z80), Panos (32016) as well as 6502 ADFS. The Acorn Z80 Second Processor as supplied requires a new BIOS ROM to run CP/M.

## WINCHESTERS FOR SMALL NETWORKS

Solidisk will soon introduce the NET-DISC Filing System (NDFS). This, although using the standard ECONET hardware, implements a direct link between any workstation and the Winchester disc drive on station 254. No dedicated file server machine (nor any Second Processor to run the File Server software) is needed.

The NDFS will also be suitable to network 32016 and Z80 Second Processors. The cost saving is substantial, especially for small networks. For example, four workstations sharing one Winchester via such a network is cheaper than four stand-alone machines equipped with local floppy disc drives.

## WINCHESTERS FOR LEVEL 2 FILE SERVERS

The Solidisk Winchester Disc Filing System (WDFS) ROM enables the Acorn File Server (Level 2) to use the Winchester in place of floppy disc drives. This will improve both speed and capacity. The WDFS will work with either the 8271 or the 1770 Disc Interfaces.

## HIGHER CAPACITY, RELIABILITY AND SPEED

The Winchester drives have much higher capacity than floppy discs, measured in Megabytes instead of Kilobytes. The disc is protected from dirt by a sealed casing, and has a much higher inherent reliability. The disc rotates continuously at high speed (3600rpm) enabling data to be transferred 20 times as fast as floppy discs.

## HARDWARE REQUIREMENTS

To use a Solidisk Winchester, you will need a 1770 Disc Interface (Acorn or Solidisk). Master and BBC B Plus machines have this as standard. If your BBC B has no disc interface, we recommend the Solidisk 1770 Disc Interface. If you already have the 8271 Disc interface, we recommend the Solidisk 8271+1770 Disc Interface. The Winchester drive is connected to the 1MHz bus socket.

## 5.25 inch WINCHESTERS

These drives (10, 20 and 40 Megabytes formatted) are of established design, with low noise and power consumption and have the same "form factor" as a half-height floppy drive.

## 3.5 inch WINCHESTERS

These are of the latest technology, with even lower noise and power consumption in a smaller package, and have the same "form factor" as a 3.5 inch floppy drive.

## BEEB-POWERED OR MAINS-POWERED

The Beeb-powered Winchesters are only suitable for use with machines fitted with the shiny, switched mode power supply and all Master series. The Winchester power lead will also support a floppy disc drive. In other cases, a mains-powered Winchester should be specified.

## THE SOLIDISK WINCHESTER RANGE

Each Winchester drive comes with:

— Integral power and data leads.
— DFS (or WDFS on request) and ADFS ROM set.
— One utility diskette in 5.25 inch, 80-track double-sided ADFS format.
— Manuals covering the above hardware and software.
— One year guarantee.

The Solidisk Winchesters are available in the following packages:

| | BEEB-POWERED | MAINS-POWERED |
|---|---|---|
| **10 Megabytes 5.25 inch** | **£499.00** | **Not available** |
| **20 Megabytes 3.5 inch** | **£720.00** | **Not available** |
| **20 Megabytes 5.25 inch** | **£661.25** | **£747.50** |
| **40 Megabytes 5.25 inch** | **£1062.60** | **£1148.85** |

**Delivery (in the UK) by courier £10.00. All prices include VAT at 15%.**

# SOLIDISK MEMORY UPGRADES

Solidisk memory upgrades for the BBC Model B offer excellent value for money. Their designs stand our for compatibility, speed, versatility and computing power. They use the latest component technology to achieve the lowest possible power consumption and size at low cost.

## External ROM Cartridge

This comprises an adaptor which plugs into any ROM socket, and a blank cartridge which will accept one or two ROMs. These may be of 16K, 32K or 64K, depending on the capacity of the ROM socket holding the adaptor. This system is particularly useful for seldomly used ROMs, which are well protected by the cartridges. They can be installed and removed repeatedly without any risk to the ROMs and are compatible with Acorn cartridges.



## Fourmeg CPU and ROM Expansion

The Fourmeg board plugs into the 6502 Processor socket, and two additional connections are made b sprung clips. It also provides one 64K and three 32K additional ROM sockets.

By adding faster memory and a 4MHz Processor, th board enables the BBC to run most programs in hal the time. The new Processor is equivalent to that us on the Acorn TURBO board. It will run most Master software such as the new BASIC 4 and at twice the speed.

A switch selects between normal (2MHz) and fast (4MHz) speed. The higher speed is available to all ROMs and RAM installed in the Fourmeg board. Th rest of the machine is unaffected.

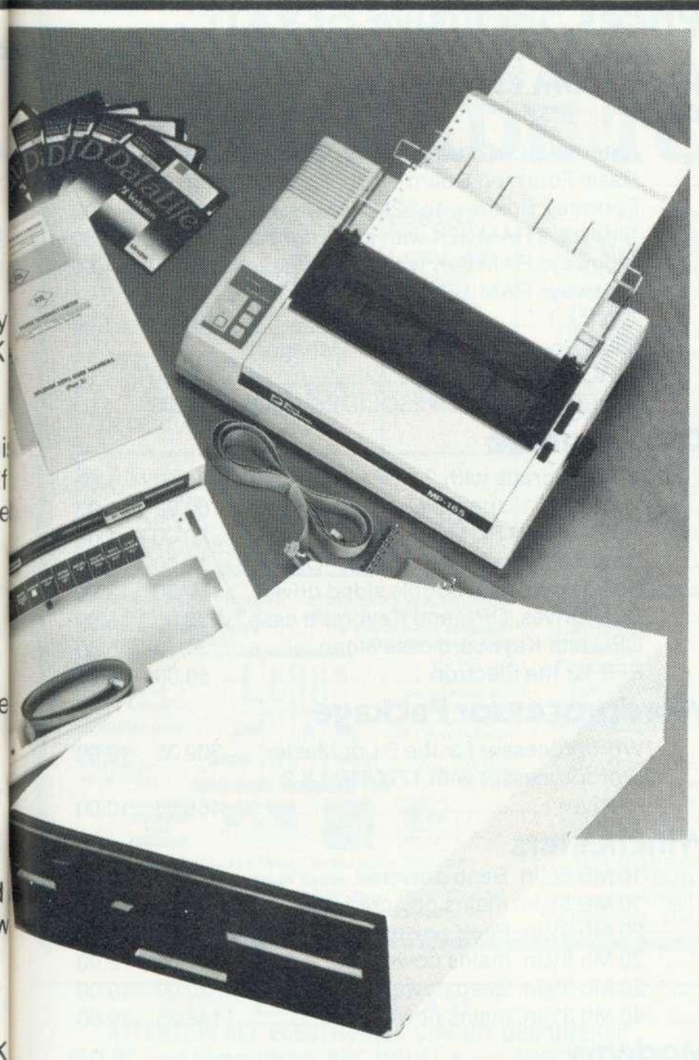
## Fourmeg Board with 32K RAM

This comprises a Fourmeg board with 32K RAM and 16K MANAGER ROM. This extra RAM gives Shado RAM and Sideways RAM capability. Shadow RAM supports the screen in any mode, leaving all the machine RAM free. Sideways RAM can contain the images of two Sideways ROMs or used as RAMDISK or printer buffer. Shadow and Sideways RAM, and th four additional ROM sockets can be switched to the fast 4MHz speed.

## 32K, 64K and 128K Sideways RAMS

These are the most popular add-ons for the BBC Model B. You can start with 32K and upgrade later to 64K, 128K (and even 256K). The 64K and 128K RAM boards have two 32K additional ROM sockets.

Solidisk Sideways RAM boards are compatible with most add-ons except ROM boards — which they replace. Sideways RAM can run almost all software that is normally available in ROM. Solidisk has a larg library of application programs. These include Word processor, Spelling Checker, Database, Spreadshee Extended Basic, Sprites, Ramdisc, Printed Buffer, Machine Code Monitor etc. and more than 70 computer games especially written for Sideways RAM. The programs are available in three packs, eac of 5 discs, in 40 or 80-track formats. Pack 1 is include with all Sideways RAM board. Packs 2 and 3 cost £10.00 each (£1.00 p&p). Pack 3 consists entirely of games and game design tools.



## The 256K Board

This has 256K of RAM, four ROM sockets, a 4MHz Processor, a 32K Manager ROM, together with WORDWISE PLUS — the best selling Wordprocessor from Computer Concepts.

The 256K RAM can be used as Shadow RAM, Sideways RAM and RAMDISK, or any combination of the three.

## Real Time Clock and Solidesk

The Real Time Clock (RTC) is battery powered, giving accurate time and date. The "SOLIDESK" ROM uses the 50 bytes of battery backed RAM in the RTC chip to custom-configure the BBC computer on start-up — just like the new Master Machine. It also presents a friendly ICON/MOUSE environment — with calculator, memo and a number of disc operating system commands (DFS and ADFS). An AMX Mouse or a Marconi Tracker Ball is preferred as the input device, but the keyboard may also be used.

## Floppy Disc Drives

Solidisk floppy disc drives are 80-track, double-sided, 5.25 inch, with a capacity of 640K in ADFS or Solidisk double density DFS. They are Beeb-powered, supplied cased, with power and data leads, and a software pack of 5 diskettes.

## The CPU and Keyboard Case

This compact steel case can hold a BBC and two 5.25 inch half-height floppy disc drives. The keyboard is housed in a separate case connected by a 24 inch lead. With the monitor on top, it improves your viewing angle and leaves your desk uncluttered.



**BBC Master in Stock,**
**Special Package Offers Available**

1) 128K BBC Master, with Wordprocessing package .................................£750
2) Business Pack: complete 3 operating 128K Master keyboards, Econet, 160cps printer, 20MB Winchester, 1 floppy drive, Wordprocessor, database, spreadsheet, all leads and manuals. Call for demo. Ideal for small offices ........................................... £2399.00

All prices include VAT, delivery extra.



**Solidisk Technology Ltd 17 Sweyne Avenue, Southend SS2 6JQ**

# The Linemaster ROM

The Solidisk Linemaster ROM allows the BBC micro to communicate with other computers. In addition to the standard Terminal and Prestel modes, it has Viewdata Host Mode and the ability to autodial and autoanswer, all controlled by software.

## Telecom Gold

Telecom Gold is the British Telecom electronic Mail Service enabling computer users to send and receive messages, telexes and to access many large databases. The Linemaster ROM allows you to use the BBC computer to communicate with Telecom Gold and Bulletin Boards. Its features include various baud rates and protocols, an elapsed time clock and 40/80 column screen display.

## Prestel

Prestel i the British Telecom Viewdata service. The Linemaster ROM offers extensive facilities to communicate with Prestel. If you have an autodialling Modem, a simple command such as *PRESTEL 618 (for London) can put you "online" with the local Prestel computer.

## Viewdata Host

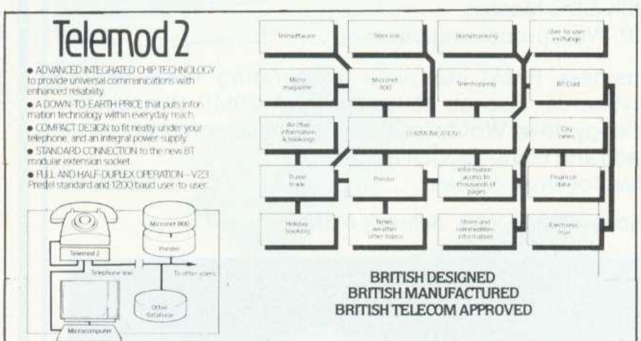
In this mode, your BBC is set up as 'Prestel look alike'. Other users can communicate with your computer exactly as with Prestel. They can browse through pages that you create using Linemaster.

## Modems

The Linemaster ROM works well with all RS423 type modems, eg Telemod, Nightingale, Miracle etc. but not all modems support all the features of the Linemaster.

## Telemod 2 Modem

The Telemod 2 is a high quality, mains powered, BABT approved MODEM for direct connect. This means that there are no rubber cups to fit the telephone into, but just a connection to a modern socket, with the telephone plugging into the back of the modem. The modem supports 1200/75 baud (V23) communications protocol as in Prestel and Telecom Gold.




## Solidisk local experts

Soidisk has a nationwide network of more 90 local experts and a growing number of experts overseas. They do not usually sell our equipment but can generally fit it free of charge. Please ring Solidisk Sales office. If you wish to call at our office for a fitting however, it is necessary to make an appointment.

**Telephone Southend (0702) 354674 (16 lines)**

ORDER BY MAIL: Please complete the coupon opposite (or a copy) and send it to:

# Prices, inclusive of VAT:

## RAM/ROM expansion

| Qty | | Price | P&P |
|---|---|---|---|
| ....... | External ROM cartridge adaptor | 15.00 | 1.00 |
| ....... | Basic Fourmeg Board | 30.00 | 1.00 |
| ....... | Fourmeg Board with 32K RAM | 69.00 | 1.00 |
| ....... | Sideways RAM 32K with software pack 1 | 50.00 | 1.00 |
| ....... | Sideways RAM 64K with software pack 1 | 80.00 | 1.00 |
| ....... | Sideways RAM 128K with software pack 1 | 125.00 | 1.00 |
| ....... | 256K Board with WW+ and Manager ROM | 175.00 | 1.00 |
| ....... | Real Time Clock and SOLIDESK ROM | 29.00 | 1.00 |

## Disc Upgrade

| Qty | | Price | P&P |
|---|---|---|---|
| ....... | 1770 Upgrade with 2.2 DFS ROM | 45.00 | 1.00 |
| ....... | 1770 + 8271 Upgrade 2.1 DFS ROM | 60.00 | 1.00 |
| ....... | ADFS + DFS ROM set | 20.00 | 1.00 |
| ....... | Upgrade from DFS to ADFS + DFS | 10.00 | 1.00 |
| ....... | Solidisk 80 track double sided drive | 109.00 | 3.00 |
| ....... | Dual Drives, CPU and Keyboard case | 230.00 | 6.00 |
| ....... | CPU and Keyboard case alone | 30.00 | 6.00 |
| ....... | EFS for the Electron | 59.00 | 1.00 |

## Wordprocessor Package

| Qty | | Price | P&P |
|---|---|---|---|
| ....... | Wordprocessor for the B+ or Master | 309.35 | 10.00 |
| ....... | Wordprocessor with 1770 DFS & 2 drives | 458.85 | 10.00 |

## Winchesters

| Qty | | Price | P&P |
|---|---|---|---|
| ....... | 10 MB 5¼in. Beeb powered | 499.00 | 10.00 |
| ....... | 10 MB 5¼in. mains powered | 569.00 | 10.00 |
| ....... | 20 Mb 5¼in. Beeb powered | 661.25 | 10.00 |
| ....... | 20 Mb 5¼in. mains powered | 747.50 | 10.00 |
| ....... | 20 Mb 3½in. Beeb powered | 720.00 | 10.00 |
| ....... | 40 Mb 3½in. mains powered | 1148.85 | 10.00 |

## Modems

| Qty | | Price | P&P |
|---|---|---|---|
| ....... | Linemaster ROM and manual | 10.00 | 1.00 |
| ....... | Telemod 1 MODEM (BABT approved) with Linemaster ROM | 50.00 | 3.00 |
| ....... | Other MODEMS | P.O.A. | — |

## Datalife Diskettes

| Qty | | Price | P&P |
|---|---|---|---|
| ....... | MD525 (SS/DD) box of 10 | 16.00 | 1.00 |
| ....... | MD557 (DS/QD) box of 10 | 25.00 | 1.00 |

## EPROMS

| Qty | | Price | P&P |
|---|---|---|---|
| ....... | 2764-25 25pcs. (to clear) | 25.00 | 1.00 |
| ....... | 27128-25 (or better) pack of 5 | 25.00 | 1.00 |
| ....... | 27256-25 (or better) pack of 3 | 25.00 | 1.00 |
| ....... | UVIPROM Eprom Programmer | 19.00 | 1.00 |
| ....... | UVIPROM32 for our 27256's | 21.00 | 1.00 |
| ....... | UVIPAC Eprom eraser | 20.00 | 1.00 |
| ....... | Solidisk Toolkit ROM | 10.00 | 1.00 |

Total ..............................

Name: ..............................

Address: ..............................

..............................

..............................

VISA

ACCESS

We reserve the right to change prices and specifications without notice. If you wish to call at our office, please telephone for an appointment.

**Solidisk Technology Ltd 17 Sweyne Avenue, Southend SS2 6JQ**

# THINKING OF EXPANDING YOUR MEMORY OR UPGRADING TO DISKS?

## WHY NOT DO BOTH AT ONCE, AND A GREAT DEAL MORE BESIDES!

# UPGRADE TO THE MASTER

### DETAILS OF YOUR MACHINE

| | MORE THAN TWO YEARS OLD | TWO OR LESS YEARS OLD |
|---|---|---|
| WITHOUT ACORN DISK INTERFACE | £150 | £200 |
| WITH ACORN DISK INTERFACE | £200 | £250 |

**COMPSHOP PRICE PROMISE** – We guarantee to match the price on equipment offered from stock through any other supplier.

Educational enquiries and orders welcome.

Quotations given.

One year warranty on all products.

COMPSHOP was established in 1978 and has continually offered the best in micro computers to discerning customers.

We sell only computers and peripherals, and therefore can offer the support many other shops cannot.

All prices quoted are exclusive of VAT.

14 Station Road, New Barnet, Hertfordshire, EN5 1QW
*(Close to New Barnet BR Station - Moorgate Line)*
Telephone: 01-441 2922 (Sales) 01-449 6596 Telex: 298755 TELCOM G
*OPEN (BARNET) - 10am - 7pm - Monday to Saturday*

THE BBC Master Series Computer is the most significant British machine to be launched since the BBC Model B. It is not only compatible with the much loved Model B and B Plus, but can be uprated with the addition of an internal board to run MSDOS, with 512K bytes RAM.

**THE MASTER 128 SPECIFICATION**

**RAM:** 64K Bytes main
64K Bytes sideways
50 Bytes CMOS Battery

**ROM:** 128K Bytes consisting of:
35K Operating system + Terminal software
16K Basic — 16K Viewsheet
16K Text Editor — 16K DFS (B+ Compatable)
13K View 3.0 — 16K Advanced DFS

3 Internal ROM sockets
2 External cartridge rom sockets
Real-time clock with battery back-up
20 Key numeric pad

**Plus normal BBC interfaces of:**

| | | |
|---|---|---|
| Disk | RGB Monitor | Analogue |
| 1 MHz BUS | T.V. UHF | RS423 |
| Cassette | Tube | Video |
| Printer | User port | |

For current owners of BBC Model B, a part exchange may be possible. The table opposite gives an indication of the allowance we will give you on your present machine.

By taking advantage of this offer, you can be sure that your system remains 100% compatible with Acorn's software and peripherals, and that there are no fiddly 'piggy-back' boards or 'flying leads' to degrade reliability.

This offer means that Compshop has a number of SECOND HAND BBC 32K machines for sale, all with 3 months warranty. So if you want a BBC but can't afford a new one, phone us for prices and availability.




**BBC Master Series Computers**

| | |
|---|---|
| BBC Master 128 | £435.00 |
| Turbo Upgrade | £109.00 |
| 512 Upgrade | Call |
| SC Upgrade | Call |
| Second Hand BBC 32K from | £150 |

**Cumana Disk Systems**

| | |
|---|---|
| CSX100L | £69.00 |
| CSX400 | £89.00 |
| CS100L | £89.00 |
| CS400 | £105.00 |
| CD200L | £164.00 |
| CD800S | £198.00 |

**Printers**

| | |
|---|---|
| Kaga KP810 | £195.00 |
| Epson LX80 | £199.00 |
| Juki 6100 | £279.00 |

**Monitors**

| | |
|---|---|
| Microvitec 1431 | £169.00 |
| 1451 | £219.00 |
| Philips 12" | £69.00 |
| Luxor RCTV 20" | £299.00 |

## Low Cost C.A.D.

**ATTENTION ALL ELECTRONICS CIRCUIT DESIGNERS!!**

**IBM PC (and compatibles), BBC MODEL B and SPECTRUM 48K**

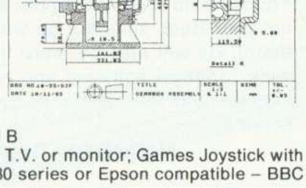
"ANALYSER" computes the A.C. FREQUENCY RESPONSE of linear (analogue) circuits. GAIN and PHASE, INPUT impedance, OUTPUT impedance, and GROUP DELAY (except Spectrum version) are calculated over any frequency range required. The effects on performance of MODIFICATIONS to the circuit and component values can be speedily evaluated.
Circuits containing RESISTORS, CAPACITORS, INDUCTORS, TRANSFORMERS, BIPOLAR AND FIELD EFFECT TRANSISTORS, and OPERATIONAL AMPLIFIERS can be simulated – up to 180 components (IBM version).
Ideal for the analysis of ACTIVE and PASSIVE FILTER CIRCUITS, AUDIO AMPLIFIERS, LOUDSPEAKER CROSS-OVER NETWORKS, WIDE—BAND AMPLIFIERS, TUNED R.F. AMPLIFIERS, AERIAL MATCHING NETWORKS, TV IF AND CHROMA FILTER CIRCUITS, LINEAR INTEGRATED CIRCUITS etc, etc.
"ANALYSER" can greatly reduce or even eliminate the need to breadboard new designs.
Used by INDUSTRIAL, GOVERNMENT and UNIVERSITY R&D DEPARTMENTS worldwide. IDEAL FOR TRAINING COURSES. VERY EASY TO USE. Prices from £20 to £195.

## LOW COST COMPUTER DRAUGHTING

**ON THE BBC MODEL B**

"DRAWER" enables quality drawings to be created and modified, quickly, easily and with the minimum of hardware. Positional input is by standard games joystick. All of the major program elements are written in machine code giving exceptional speed of operation.

★ Rubber Banding for drawing lines
★ Solid or Dotted line types
★ Circles, Arcs and partial or complete Ellipses
★ Vertical or Horizontal Text
★ Pan and Zoom
★ Merging of drawings and library symbols from disc
★ Snap to a user defined grid
★ Absolute or Relative cursor co-ordinates displayed on the screen
★ Output to standard dot matrix printer
★ Price £45 excl VAT



Minimum Hardware required: BBC Model B
Single or Dual Disc Drive – 40 or 80 track; T.V. or monitor; Games Joystick with "fire button"; Dot Matrix Printer (Epson 80 series or Epson compatible – BBC Default Mode).

**For illustrated leaflets and ordering information please contact:**
**NUMBER ONE SYSTEMS LIMITED** — **TEL: 0480 61778**
**Ref: AU** — **TELEX: 32339**
**9A Crown Street,**
**St Ives Huntingdon, Cambs PE17 4EB**

# CYGNET ELECTRONICS

*NEW LAUNCH*

# 'RAMWISE II'

## 32K RAM/ROM BOARD

Only £38.95 inc.

Expand the capacity of your BBC MICRO to 32K sideways RAM Plus TWO EXTRA ROM sockets

This provides a total of 8 sideways ROMS, 6 ROM sockets plus 2 banks of 16K sideways RAM

**★Battery backup fitted as standard**
**★Write protect switch included**
**★No soldering**
**★Utilites disk to save and load ROMs provided free**
**★Load capability**
**★Runs all existing ROMS**

STILL AVAILABLE AT NEW LOW PRICE OF
£21.50 inc
RAMWISE 16K RAM MODULE

**★Small module plugs directly into spare rom socket.**
**★Write protect switch provided.**
**★Runs all existing ROMS**
**★Already used in schools on ECONET and ENET systems**

**Post to Cygnet Electronics, PO Box 27, Bordon, Hants GU35 0HH**
**Tel: (04203) 5229**

AA162

## A New Concept in Software

Letters, Notes, Reports, Articles, Books, . . . .
Ease creative writing with

**BBC SCRATCHPAD BBC**

The ideas organiser for creative writers

Organise your thoughts and make the ideas flow

* A suite of programs based on scientific knowledge about our thought processes
* Written by an established author
* Icon driven
* Fully tube compatible
* Spool to your word processor files
* Completely user-friendly
* Single or double disk drives

SCRATCHPAD makes writing so much easier – all you have to do is add the words.

Price £24.95 (incl p&p)
INNOVATIVE SOFTWARE (AU)
41 Walter Road, Swansea

AA71A



# ZONEFOUR LTD.

WE ARE **DISKXPRESS**
DISTRIBUTORS FOR THE U.K.

YOU HAVE SEEN US AT SHOWS *NOW* BUY THROUGH **ACORN USER** IN LIBRARY CASES

| | | | | |
|---|---|---|---|---|
| 5¼" | S/S | D/D | | 10's£9.95 |
| | D/S | D/D | | 10's£10.55 |
| | D/S | D/D | 96TPI | 10's£10.95 |

**NEW UNIVERSAL 5¼" ALL FORMATS £14.95**
FOR ALL EXCEPT HARD SECTORED/HIGH DENSITY MACHINES

**BULK DISCS**

| | | | | |
|---|---|---|---|---|
| 5¼" | S/S | D/D | | 50's£30.00 |
| | | | | 100's£55.00 |
| | D/S | D/D | 96TPI | 50's£35.00 |
| | | | | 100's£65.00 |
| 3½" | S/S | D/D | 138TPI | 10's£19.95 |
| | D/S | D/D | 138TPI | 10's£25.95 |

ALL PRICES INCLUDE VAT AND P/P
TO ORDER PLEASE CALL DIRECT DISK LINE:
**ZONEFOUR LTD, 122 DAWES ST, LONDON SE17 2EB Tel. 01-701 6284**

VISA

PLEASE CALL FOR BULK AND INSTITUTIONAL PRICES

AA115



Design your own

# PCB

with the

# BBC COMPUTER

Lay out double sided PCB on the screen, separating the layers by colour. Store design on disc, recall for editing or plot it on an **Epson HI-80**. A-4 plotter ready for 2:1 photo reduction. 40 or 80 Trac disc based software £20.

**VINDEREN ASSOCIATES, PO BOX 130, BELFAST BT9 6NB. TEL: 0232 667885**

AA117



# PRINTERLAND

ORDERED TODAY DELIVERED TOMORROW

**UK's LOWEST PRINTER PRICES**

VISA

GOVERNMENT AND OFFICIAL OVERSEAS ORDERS WELCOME

*Free*... WITH ALL PRINTERS BBC USERS PRINTERS GUIDE

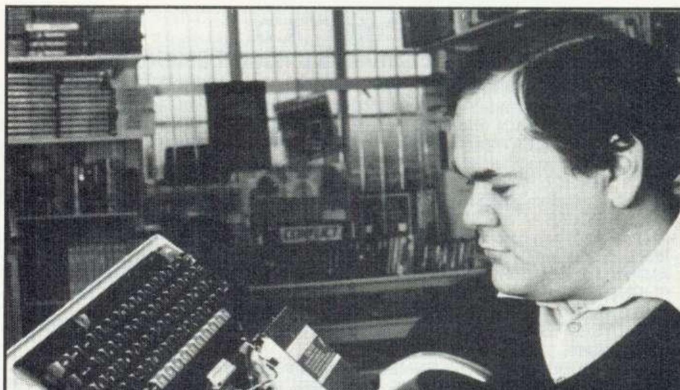
**KAGA TAXAN KP810** - PLEASE RING FOR UNBEATABLE PRICE.

| DOT MATRIX PLUS NEAR LETTER QUALITY | Ex VAT | Inc VAT |
|---|---|---|
| SHINWA CP A80 + NLQ | £165.00 | £189.75 |
| EPSON LX 80 | £190.00 | £224.25 |
| CANON 1080A | £219.00 | £251.85 |
| JUKI 5510 | £209.00 | £240.35 |
| CANON 1156 | £335.00 | £385.25 |
| EPSON FX 85 + | £360.00 | £414.00 |
| EPSON FX 105 + | £455.00 | £523.25 |
| EPSON LQ 800 | £515.00 | £592.25 |
| EPSON LQ 1000 | £546.00 | £627.90 |
| EPSON LQ 1500 | £715.00 | £822.25 |
| **DAISY WHEEL** | | |
| QUENDATA 1120 | £225.00 | £258.75 |
| EPSON DX100 - SPECIAL OFFER | £356.00 | £409.40 |
| **COLOUR PRINTERS** | | |
| EPSON JX-80 - SPECIAL OFFER | £450.00 | £517.50 |
| **PRINTER TYPEWRITER COMBINED** | | |
| JUKI 2200 | £245.00 | £281.75 |
| **MONITORS** | | |
| PHILIPS 7502 GREEN | £75.00 | £86.25 |

NOW ONLY 3 MINUTES FROM JUNCTION 23 M62
(MANCHESTER 25 MINUTES/ LEEDS 20 MINUTES)
N.B. From East use Junction 24

156 LONGWOOD GATE
LONGWOOD
HUDDERSFIELD
TEL: 0484 646048/9





# You bend em We mend em!

Young David (Son of Snapper to friends) will be pleased to sort out your Beeb should it go wrong. A chip here, a six inch nail there!! He will also be more than pleased to demonstrate our wide range of software and hardware. We are official Acorn dealers and take pride in friendly and efficient advice and service.

**NUMBER ONE IN BROMLEY**

# Data Store

6 Chatterton Road, Bromley, Kent. 460 8991

AA54

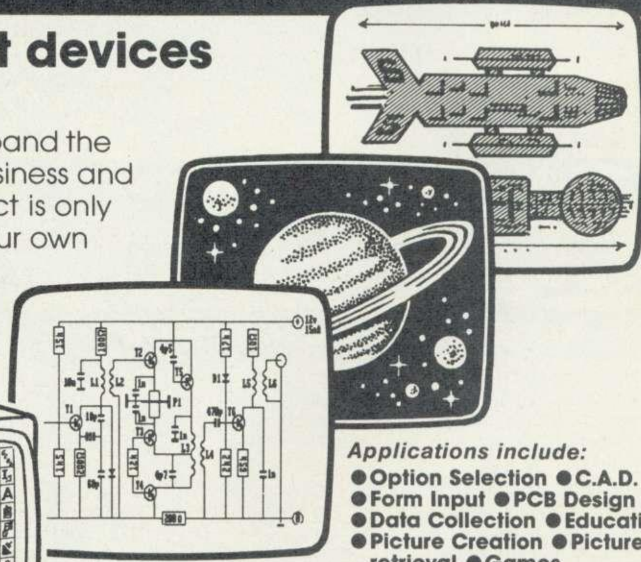
# EXPLORE THE EXCITING WORLD OF COMPUTER GRAPHICS WITH THE UNIQUE LOW COST



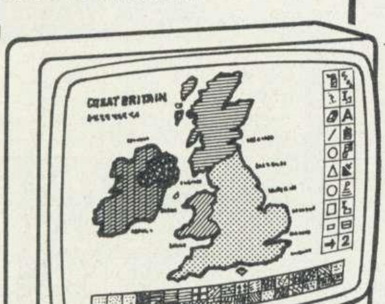
# GRAFPAD 2

## The Ultimate in graphic input devices for the BBC microcomputer

Grafpad 2 is the first low-cost graphic tablet to expand the boundries of computer graphics for the home, business and educational user. The scope of this unique product is only limited by the imagination of the user. Create your own Games, Graphics, Illustrations, Pattern Designs, Plans, Circuit Diagrams etc. in high resolution colour. With full instructions, the Grafpad 2 is an extremely easy product to master.



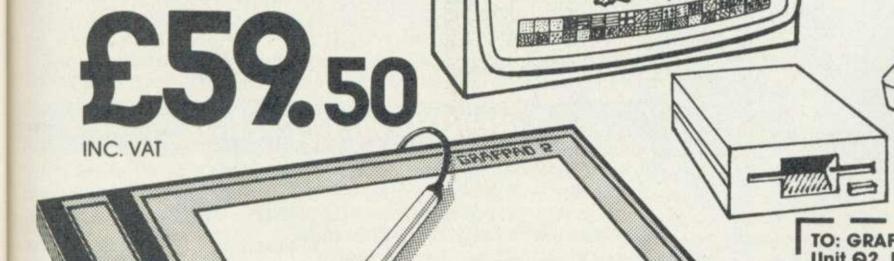
- **Near A4 size drawing area**
- **High resolution colour**
- **Home, educational and business use**
- **Variety of optional programmes**
- **FREE ICON DRAWING SOFTWARE WITH EACH GRAFPAD 2**



***Applications include:***
**●Option Selection ●C.A.D. ●Form Input ●PCB Design ●Data Collection ●Education ●Picture Creation ●Picture retrieval ●Games ●Construction Design ●Logic Design**



**£59.50**
INC. VAT




Available from most Computer Dealers or direct from Grafsales Ltd.

SPECIFICATIONS

| | | |
|---|---|---|
| **Resolution**<br>1280 × 1024 pixels | **Output rate**<br>2000 co-ordinate pairs per second | **Origin**<br>Left-hand corner or selectable |
| **Repeatability**<br>1 pixel | **Interface**<br>Parallel | **Dimensions**<br>350 × 260 × 12mm |

**TO: GRAFSALES LIMITED**
**Unit Q2, Penfold Works, Imperial Way, Watford, Herts. WD2 4YY.**
**Telephone: (0923) 43942 Telex: 946024**

Please supply me with ________ GRAFPAD 2(s) for my BBC MICRO at £59.50 **plus** £2.50 p&p, or **plus** £10 for Datapost.
(Please allow 28 days for delivery).

NAME: ____________________

ADDRESS: ____________________

____________________

____________________

I enclose cheque value £ ____________________

*If you prefer to pay by Access or Barclaycard, please state which...*

BARCLAYCARD/ACCESS Card No. ____________________

## BBC MASTER SERIES



| | | |
|---|---|---|
| **AMB15** | BBC MASTER Foundation computer 128K | **£435 (a)** |
| **AMB12** | BBC MASTER ET 128K (only ANFS) | **£348 (a)** |
| **AMC06** | Turbo (65C102) Expansion Module | **£107 (b)** |
| **ADF13** | Rom Cartridge | **£13 (d)** |
| **ADF10** | Econet Module | **£43 (c)** |
| **ADJ22** | Ref. Manual Part I | **£14.50 (c)** |
| **ADJ23** | Ref. Manual Part II | **£14.50 (c)** |
| **ADJ24** | Advanced Ref. Manual | **£19.50 (c)** |

**(Please check on delivery)**

## UPGRADE KITS

1.2 OS ROM..................**£7.50 (d)** Econet Kit.......................**£55 (d)**

DNFS ROM...............**£17.50 (d)**

**1770 DFS Upgrade for Model B..................................................£43.50 (d)**

**ADFS ROM (for B with 1770 DFS & B plus)...............................£26 (d)**

**64K Upgrade Kit for B plus £35 (d)**

## ECONET ACCESSORIES

| | | | |
|---|---|---|---|
| Econet Starter Kit | **£85 (b)** | Econet Bridge | **£174 (b)** |
| Econet Socket Set | **£34 (c)** | Printer Server Rom | **£41 (d)** |
| File Server Level I | **£75 (d)** | 10 Station Lead set | **£26 (c)** |
| File Server Level II | **£210 (d)** | Adv. Econet User Guide | **£10 (d)** |

## ACORN 32016 CO-PROCESSOR

Acorn Cambridge Co-processor combines with the BBC micro to provide full 32 bit processing. The National Semiconductor 32016 processor performs all language and application processing, the NS32081 floating point processor maximises the performance and provides support for IEEE standard fp handling.

The specially developed operating system PANOS, provides efficient interfacing between the languages and the hardware and software of the BBC micro incl. the variety of ACORN filing systems: DFS, ADFS and NFS. PANOS provides a variety of utilities including a full screen editor and a linker providing acces to both library routines and cross language linking.

FORTRAN 77, PASCAL and C languages with mainframe type implementations, fully compiled and provided with appropriate library support are included. Other languages include, Cambridge LISP with its compiler, a 32016 assembler and a 32bit interpreted implementation of BBC BASIC with full screen editor. 1 Mbyte of RAM is included as standard.

**32016 CO PROCESSOR (Currently available from stock) £1130 (a)**

***Please phone or write for full specifications on the Cambridge Co-processor and Cambridge Workstation.***

## WINCHESTER DRIVES

Acorn Hard Discs are now available in 10 and 30 Mbyte versions. The drive plugs into the 1 MHz bus. The ADFS filing system with its hierarchical filing structure provides excellent file management facilities. Data transfer rate of 1Mbit/sec and average seek time of 85 ms provides the user very fast access to very large amounts of data. File Server Level III is installed as standard on Acorn Winchesters. Non Acorn drives are fully compatible with the Acorn ADFS system and Torch Z80 system and offer a good value for money.

| | |
|---|---|
| **Acorn 10 Mbyte Winchester** | **£1100 (a)** |
| **Acorn 30 Mbyte Winchester Drive** | **£1630 (a)** |
| **5 Mbyte Hard Disc** | **£600 (a)** |
| **20 Mbyte Hard Disc** | **£1025 (a)** |

## TECHNOLINE

PHONE
TECHNOLINE
01-450 9764
FOR DETAILED SPECS
ON THE MASTER
SERIES & UPGRADES

**TECHNOLINE offers you 24 hour, 7 days a week ordering/information**
***New Products *Comment Box**
***Technical Pages *Comments on Stock and availability of Products**
***Placing of Orders**

**Techno-Line 01-450 9764**
**24 hour, 7 days a week.**

Technical Information:
1200/75 Baud. Standard Viewdata/Prestel Protocols.
**Please note that a 'Prestel' type terminal must be used.**

**Now available for use. 01-452 1500**
**(Week days 7pm-9am, 24 hours Weekends)**

## EPROMs/RAMS

**2764-25.........£2.00 (d) 27128-25.........£2.50 (d)**
**6264LP-15........£3.40 (d)**

## ACORN 2nd PROCESSORS

**Acorn Z80 2nd Processor:** Z80 CPU with 64K of RAM housed in a separate case with a integral power supply interfaces with the BBC computer through the TUBE. It converts the BBC into a CP/M system and its comprehensive package of software provides a suitable basis to set up a business system. **£329 (a)**

**Acorn 6502 2nd Processor:** This processor provides faster data processing speeds and larger memory. Particularly useful for use with Hi View word processor for production of large documents. **£162 (b)**

## MULTIFORM Z80 2nd PROCESSOR

This processor converts your BBC into a power CP/M system and make it capable of operating in almost any CP/M format. Full details on page 5. **£299 (b)**

## TORCH Z80 2nd PROCESSOR

**ZEP100:** This Z80 processor with 64K fits internally in the BBC computer and has the operating system in a ROM. It is supplied with the PERFECT suite of software comprising of a database, wordprocessor and a spreadsheet and a BBC BASIC for Z80. **£199 (a)**

**TZDP240:** ZEP100 with TECHNOMATIC PD800P dual drive with built in monitor **£469 (a)**

## ACORN TELETEXT ADAPTOR

This adaptor will convert the BBC computer into a teletext receiver capable of decoding and displaying the CEEFAX and ORACLE pages and the monitor screen. These pages can also be saved for later reference. BBC TV transmit educational software on their CEEFAX system which can be downloaded free of charge. **£125 (b)**

## ACORN IEEE INTERFACE

This interface enables a BBC computer to control any scientific and technical equipment that conforms to the IEEE488 standard, at a lower price than other systems, but without sacrificing any aspect of the standard. The interface can link up to 14 IEEE compatible devices. Typical applications are in experimental work in academic and industrial laboratories, with the advantage of speed, accuracy and repeatability. The interface is mains powered and comes with cables, IEEEFS ROM, and user guide. **£278 (a)**

## ROBOCOM BITSTICK

The renowned 'BITSTICK' graphic CAD package. Using the on-screen menu and colour pallette, it can draw freehand as well as lines and shapes with great accuracy. Any part of a drawing may be magnified many times, and up to 192 drawings may be saved on a disc. In total, a friendly yet sophisticated CAD system offering tremendous value.

**ROBOCOM BITSTICK I** **£299 (a)**

**ROBOCOM BITSTICK II:** This package is as Bitstick I with software upgraded to allow scaling and auto dimensioning. Multiplotter driver is also supplied with the package. **£769 (a)**

| | |
|---|---|
| **Upgrade for Bitstick I to II** | **£415 (b)** |
| **Bitstick Multiplotter Driver** (most popular plotters included) | **£69 (b)** |
| **Epson FX80 Screen dump routine for Bitstick I** | **£35 (d)** |
| **Epson FX80 dump for Bitstick II** | **£39 (d)** |

## BBC COMPUTER SPARE PARTS (Carriage code (d))

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Complete Keyboard | £52 | 6502A 2MHz CPU | £6.50 | UPD7002 | £5.00 | 74LS163 | £0.75 |
| Power Supply Unit | £52 | 65CO2 CMOS CPU | £12.00 | DS3691 | £3.50 | 74LS244 | £0.80 |
| Keyswitch | £1.75 | 6522 VIA | £3.50 | 7438 | £0.40 | 74LS245 | £1.10 |
| Keyboard Connector | £4.00 | 6522A 2MHz VIA | £5.50 | 74LSOO | £0.24 | 74LS373 | £0.90 |
| Video ULA | £18.00 | LM3 24 op-amp | £0.45 | 74LSO4 | £0.24 | 74LS393 | £1.00 |
| Serial ULA | £14.00 | SAA5050-Teletext | £9.00 | 74LS10 | £0.24 | 8271 | POA |
| UHF Modulator | £4.50 | 6845SP CRT Controller | £6.50 | 74LS123 | £0.80 | 88LS120 | £3.00 |

# DISC DRIVES



**Your computer installation can look like this with our PD800P drive**

This highly successful drive offers unique features:

New slimline Mitsubishi mechanisms with ultra low power consumption (only 8 watts per mechanism), front locking lever and capable of single or double density operation. Ultra fast track access times and head settling times.

Fully compatible with the DFS and ADFS filing systems on the new MASTER's range.

40/80 switchable with switches located on the front panel. A generously rated switch-mode power supply ensures reliability with minimum heat dissipation for long periods of operation.

The mechanisms are set inside a sturdy monitor stand painted in 'BBC-matching' beige. Its 'looks' are enhanced by its black front panel, with attractive enamel-white markings.

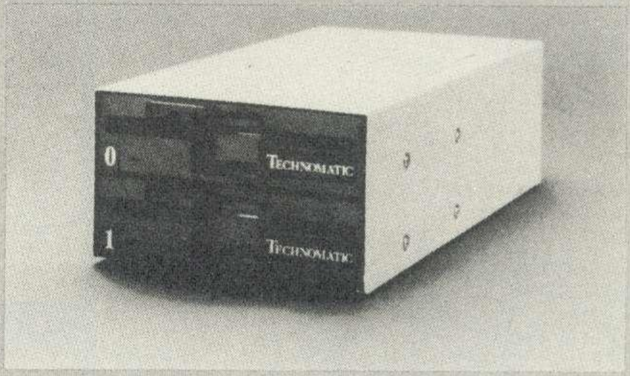
These disc drives with a built-in monitor plinth provide a compact installation and give a professional look to the system.

As with all standard TECHNOMATIC drives it comes complete with a data cable, and a mains lead with a suitably fused 13A moulded plug.

**PD800P** 2×400K/2×640K 40/80T DS **£289 (a)**

**A free pack of 3M 747 80T DSDD Lifetime warranty discs with every PD800P.**

PD800




TECHNOMATIC's stacked drives are housed in smart metal casings painted in BBC beige colour and are built to the same exacting standards as PD800P drives. The drives are fitted with integral switch mode power supply and supplied with a mains lead with a suitably fused 13A moulded plug and a data lead.

These drives are fitted with the new model MITSUBISHI mechanisms, which have been specially adapted for us to fit the 40/80 track switches on the front panel of the mechanisms. This would mean that the user no longer needs to grope at the rear of the drive to set the correct track setting.

**PD800** (2 × 400K/2 × 640K 40/80T DS) **£269 (a)**

**TD800** (as PD800 but without the psu) **£239 (a)**

TECHNOMATIC's single drives are also housed in metal casings painted in BBC beige colour and are offered with or without power supply. All drives are supplied with data cables and suitable power leads. Mains powered drives have a lead suitably fused with a 13A moulded plug.

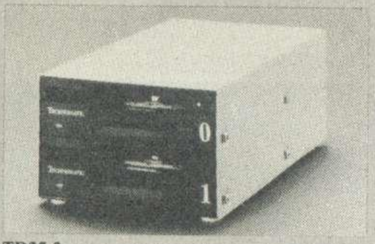
1 × 400K/1 × 640K 40/80T DS

**TS400 £119 (b) PS400** with psu **£139 (b)**

## SPECIAL OFFER

ACORN's Single Teac slim line Drive 1 × 100K/1 × 160K only £49 (b)

## 3.5″ DRIVES



TD35 2

These compact drives, used with most of the new 16 bit micros offer fast access times and high performance with minimum of power consumption. The mechanisms are 80 track double sided and are capable of both single and double density operation. The single drive is offered in a dual case with a blanking plate for future upgrading. The drives are offered with or without integral mains power supply and they are supplied with all the necessary cables to make them ready for connection to a computer. Mains powered drives are supplied with a lead with suitably fused 13A moulded plug.

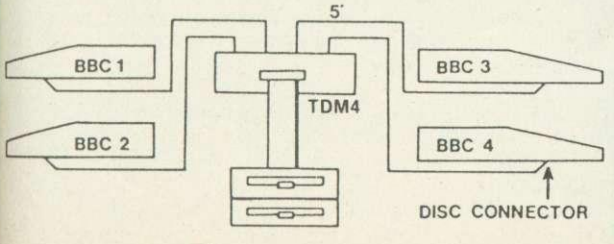
1 × 400K/1 × 640K 80T DS : TS35 1 **£115 (b)**; PS35 1 with psu **£130 (b)**

2 × 400K/1 × 640K 80T DS : TD35 2 **£205 (b)**; PD35 2 with psu **£220 (b)**

***All drives listed above are fully compatible with single and double density DFSs. The larger capacity referred to above is for the Acorn's ADFS system.***

## DISC DRIVE MULTIPLEXER

The cost-effective alternative to networking! A self-contained unit that enables up to four computers to be connected to one single or dual disc drive. No hardware modifications — simply plugs into the computers disc interface connectors. No ROMs or other software needed. All DFS commands work as normal. The switching of drives between computers is totally automatic and completely invisible to the user. This unit is ideal for installing in classrooms and other situations, where networking is not planned or necessary, or where costs must be kept low. In many cases software needs to be shared, although full networking complexity and cost is not needed. Several of these units can be connected in series to allow more computers to access the same discs, i.e. two quads connected together will allow 7 computers to share 1 drive. Units are supplied with 5′ of cable per outlet as standard. Mains powered.




**TDM4** Quad Unit (up to 4 computers) **£135 (a)**

**TDM2** Dual Unit (2 computers) **£75 (b)**

## 3M 5¼″ FLOPPY DISCS

40 T SS DD £10.50 — 40 T DS DD £12.75

80 T SS DD £14.75 — 80 T DS DD £16.00

£1 extra pack for library case packing

## 3M 3½″ FLOPPY DISCS

80 T SS DD £18 (d) — 80 T DS DD £25 (d)

Discs in packs of ten

FREE SWISS ARMY KNIFE for every 3 packs of discs

## DISC STORAGE BOXES

**NON LOCKABLE** — **DB530** 30 × 5¼″ **£6.00 (c)**

**LOCKABLE** — **DB340** 40 × 3½″ **£8.50 (c)**

**DB550** 50 × 5¼″ **£8.50** — **DB570** 70 × 5¼″ **£11.00 (c)**

**DB5100** 100 × 5¼″ **£13.00 (b)**

**Available at these new greatly reduced prices (for limited period only)**

## DRIVEHEAD CLEANING KIT

The **FLOPPICLENE** drive head cleaning kit is an ideal way to ensure the optimum performance of your drives. The use of disposable cleaning discs eliminates the risk of contamination and abrasion of sensitive driveheads. These risks are normally inherent in the reusable drivehead cleaning kits.

**Floppiclene with 20 disposable cleaning kits.** 5¼″ **£14.50 (d)** 3½″ **£16.00 (d)**

# TECHNOMATIC

**01-208 1177**

**BBC Computer & Econet Referral Centre**

**MAIL ORDER**
17 Burnley Road
London NW10 1ED

**RETAIL SHOPS**
15 Burnley Road
London NW10 1ED
Tel: 01-208 1177
(close to Dollis Hill ⊖)

**West End Branch**
305 Edgware Road
London W2
Tel: 01-723 0233
(near Edgware Road ⊖)

**TECHNOLINE**
24 hour Viewdata Service 01-450 9764

Orders welcome from government depts & educational establishments.

**All prices ex VAT**
**Prices are subject to change without notice**

Please add carriage
(a) £8 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00.

## EPSON PRINTERS

**EPSON LX-80 NLQ:** A new low-cost high performance dot matrix printer from Epson. Its many features include Near Letter Quality, Draft mode, programmable characters, a variety of print styles, graphics etc. Supplied with friction feed as standard 100cps.

LX-80 **£195 (a)** Optional Tractor Feed **£20 (c)**

**EPSON FX Range:** This new range designed to meet virtually every type of computer based printing requirement, from correspondence quality (NLQ) text printing, a variety of fonts, to seven different levels of graphic printing. Fully IBM PC compatible with full graphics character set from the PC's keyboard. 8K built in buffer allows either data storage or creation of upto 240 characters of your own design. 160 cps for draft print and 32 cps for NLQ.

FX85 (80 col)........... **£315 (a)** FX105 (136 col)........ **£449 (a)**

EPSON JX80 4 colour printer.................................. **£420 (a)**

**EPSON LQ Range:** This range with 24 pin dot matrix printers offers a high, 200 cps, draft speed and superb correspondence quality print at 67 cps and truly high resolution graphics and a variety of fonts.

LQ800 (80 col) **£595 (a)** LQ1500 (136 col) 2K buffer **£875 (a)**
32K buffer **£950 (a)**

## TAXAN PRINTERS

A set of economically priced printers that offers full EPSON compatibility and the near letter quality option and a facility to install 8K additional ram or 8K eprom for custom font. Both friction and tractor feeds as standard. 140 cps draft and 24 cps NLQ. A variety of fonts and graphics in six densities.

KP810 (80 col)..... Reduced..... **£160 (a)** KP910 (156 col).......... **£339 (a)**

## DAISY WHEEL PRINTERS

**BROTHER HR15:** * 14 cps * 3K Buffer * Two colour printing * Proportional spacing * Underline * Bold * Shadow print * Super/Sub script + many other features.

BROTHER HR15 **£285 (a)**

**JUKI 6100:** * 15 cps * 2K Buffer * Switchable 10/12/15 cpi * Proportional printing * Linear Motor for max reliability.

JUKI 6100 **£289 (a)**

Integrex Colour Printer **£569 (a)**
BBC Colour Screen Dump **£10 (d)**

## DOTPRINT PLUS

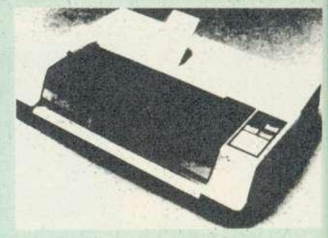
**The most versatile NLQ rom for the BBC Micro.**

DOT PRINT PLUS not only gives you the 10 character pitch at 6 lines/in with underlined and double width characters as required but unlike all other NLQ roms, it offers a lot more.

* a built in CHARACTER FONT EDITOR enables disc users to create their own type faces for use in printing spooled text files.
* a built in View Printer Driver.
* MICROSPACING for professional justification in VIEW and — with discs — in WORDWISE/PLUS.
* true BOLD PRINT in addition to double width.
* 12 char pitch as standard — providing 96 CHARACTERS PER LINE on the FX/RX 80 for example.
* simple control codes allow VARIABLE PITCH LINE SPACING in 1/72" increments and VARIABLE PITCH from 12 cpi in increments of 1/240". (10 cpi can be selected by a single control code).

In short this one rom not only will provide professional NLQ facilities, but also a view printer driver and a font designer/editor for only **£28 (d)**

## EPSON HI-80 PLOTTER



EPSON technology has once again scored a first by introducing a sophisticated A4 size plotter that does not need specialised software or programming skills to operate it and yet keep the cost within the reaches of all computer users. Features include 4 pens at a time — upto 10 colours to choose from, a variety of pen nibs, high speed plotting. Powerful software command codes include single commands to plot circles, ellipses or triangles. Line or bar graphs and pie charts can be plotted in a variety of exciting styles very simply by keying in the data into the computer.

Detailed leaflet on request.

**Epson HI-80 Plotter £325 (a)**

## CENTRONICS GLP PRINTER

A NLQ printer at an affordable price. Fully compatible with Epson control codes offering a variety of fonts including super and subscripts, and a variety of graphic modes. Serial and parallel interfaces fitted as standard. Friction feed as standard. **£109 (b)** Tractor feed **£14 (d)**

## PRINTER BUFFER & SHARERS

**BUFFALO 32K Buffer for EPSON PRINTERS:** This compact 32K buffer can be fitted internally on most EPSON printers within a few minutes. It does not require external power or any modification to the printer. It will hold about 15 A4 pages of text freeing your computer for other jobs in a fraction of the time it would normally have to wait for the printer to finish all that printing. Supplied with full fitting instructions.

**Buffalo 32K Buffer** **£75 (d)**

**PRINTER SHARER/BUFFER:** A unique sharer/buffer that provides a simple solution to improve system utilisation. It can be connected to up to three computers and it will automatically switch between the computers to scan for data — no manual switching required. High speed data input rate to the buffer cuts down the normal waiting time for the computers for the printing operation to complete and thus allowing the computers to be used for other uses. The 64K buffer would hold over 30 A4 pages of text.

Facilities include: COPY, PAUSE AND RESET. LED indication for percentage of memory available and data source. Mains powered. Send for detailed specification.

**Available in 64K and 256K versions**

TSB 64 **£199 (b)** TSB 256 **£275 (b)**

A Serial Buffer/Sharer will soon be available. Please send for details.

## PERIPHERAL & COMPUTER SHARERS

An extended range of peripheral sharers to allow the user to switch between computers, printers and modems. High quality switching mechanisms housed in fully shielded metal cases ensure reliability. No external power input required.

All lines on the sharers are fully switched (36 on parallel and 25 on serial)

| | Parallel | Serial |
|---|---|---|
| 3 Computers to a Printer | 36V36-3 £69 (c) | 25V25-3 £64 (c) |
| 4 Computers to a Printer | 36V36-4 £85 (c) | 25V25-4 £74 (c) |
| 2 Computers/2 Printers x-over | 36V36-X £69 (c) | 25V25-X £69 (c) |
| BBC Cable Set 3 to 1 (1m ea.) | £32 (c) | £34 (c) |
| BBC Cable Set 4 to 1 (1m ea.) | £39 (c) | £41 (c) |

**Computer Sharer:**
1 computer to 2 printers fitted with Cable for BBC TCS26 **£19.50 (c)**

# PRINTER ACCESSORIES

**EPSON ACCESSORIES:**

**Interfaces:**

**8143** RS232.................... **£28 (d)**
**8148** + RS232 + 8K.............. **£75 (d)**
**8165** IEEE + Cable.......... **£65 (d)**
**8148** RS232 + 2K............ **£57 (d)**
**8132** Apple II.................. **£60 (d)**
**8177P** NLQ for FX80 + /FX100 + ................. **£99 (d)**

Parallel & Serial Buffers of various size also available.

**FX80/80 + /85** Tractor Attachment........................ **£37 (c)**
**FX80/80 +** Paper Roll Holder.............................. **£17 (c)**
**LX80** Tractor Feed......................................... **£20 (c)**

**SHEET FEEDERS:**

**8338** LX80....................... **£49 (b)**
**8333** FX100 + /105............ **£169 (a)**
**8331** FX80 + /85............. **£129 (b)**
**8330** RX80 + .................... **£129 (b)**

**Ribbons:**

RX/FX80/80 + , FX85......... **£5 (d)**
LX80........................... **£4.50 (d)**
RX/FX100/100 + , FX105.... **£10 (d)**
HI80 Pen Set (Aqueous/Ball point)................................... **£7.50 (d)**

**Dust Covers:**

FX80........................... **£5.50 (d)**
TAXAN/Canon KP810........ **£6 (d)**
FX100.......................... **£7.50 (d)**
KP910.......................... **£7 (d)**

**TAXAN CANON Accessories:**

RS232 + 2K buffer........... **£78 (d)**
Ribbon............................. **£6 (d)**

**JUKI 6100**

RS232 Interface.............. **£65 (d)**
Tractor Feed................... **£129 (a)**
Ribbon (Carbon)............ **£2.00 (d)**
Spare Daisy Wheel............. **£14 (d)**
Sheet Feeder................... **£182 (a)**

**BROTHER HR15**

Daisy Wheel..................... **£18 (d)**
Tractor Feed.................... **£90 (a)**
Ribbon (Carbon/Nylon)... **£3.00 (d)**
Sheet Feeder................... **£182 (d)**
Keyboard........................ **£135 (a)**

**Printer Leads:**

BBC Parallel Lead (1.2m)..... **£6 (d)**
BBC Serial Lead (1.2m)......... **£6 (d)**

Other lengths can be supplied on order.

IBM Parallel Lead (2m)........................................ **£12 (d)**

**PAPER & LABELS**

**Plain Fanfold paper** with micro perforations:

2000 sheets 9½" × 11"............................................ **£13 (b)**
2000 sheets 14½" × 11"...................................... **£18.50 (£4.50)**

**Labels/1000:**

Single Row 3½" × 1 7/16" **£5.25 (d)** Triple Row 2 7/16" × 1 7/16" **£5 (d)**

# MULTIFORM Z80

## The MULTIFORM Z80 2nd Processor for the BBC Micro — opens the horizons of CP/M software to the BBC micro user

* Will enable running of almost any CP/M applications software
* Will enable transfer of data between different disc formats
* Emulates the two terminals most frequently used by CP/M software

**MULTIFORM Z80** interfaces directly to a normal BBC micro requiring no hardware changes. It is supplied with OS/M operating system in rom which can run all software that obeys CP/M 2.2 constraints and its configuration is not hardware specific.

**MULTIFORM Z80** is truly flexible and can be used with any BBC micro drive system, single or dual drive, 40 or 80 track format and single or double sided. Unlike other currently available Z80 processors for the BBC micro, there are absolutely no restrictions on the type of drive that can be used with the MULTIFORM Z80.

**MULTIFORM Z80** plugs into the 1MHz bus connector of the BBC micro. It is mains powered and does not put any extra load on the BBC's psu. The data cable can be several feet in length, allowing convenient siting of the MULTIFORM Z80, unlike present second processors, which have 8″ cables.

The formats supplied include: Acorn Z80, RML 380Z and 480Z, Torch (read only), Osborne, Televideo ... we also offer to configure other formats at an extra charge.''

Rom based OS/M operating system is fully compatible with Acorn's single and double density disc interfaces. Installing the OS in rom allows more space on discs for programs and data and response to system commands is very fast. (Note: Single density DFS will only read/write to single density CP/M formats).

**MULTIFORM Z80** can format, read or write from a very wide range of CP/M disc formats. On a dual drive system, the drives can be set up independently to run two different formats at the same time. This will enable:

* The user to buy software from a very wide range of suppliers without having to worry about the type of format supplied.
* Interchange of valuable data and files among users of various CP/M computers.
* Using a system at home for preparing data required in the office.
* Software writers/developers to write software in any one format and transfer it to any other format without having to pay for expensive porting charges.

**MULTIFORM Z80** is supplied with a library of a number of popular CP/M formats and a utility disc containing a program for creating files for the additional formats. Each library can load 32 formats and there are no restrictions on the number of librarires that can be created.

The utility disc also contains a program to interconvert ASCII texts wordprocessed on a normal BBC and under OS/M or CP/M.

**MULTIFORM Z80's** terminal emulation includes the ADM-3A, the HAZELTINE 1500 and the BBC VDU making the installation of most of the well known CP/M software easy.

**MULTIFORM Z80** converts your BBC computer into an almost universal CP/M machine and adds the power of being able to run two different formats simultaneously, which currently is possile on only the very sophisticated specialist machines.

For any one working or intending to work in a CP/M environment, MULTIFORM Z80 is an indispensable tool.

In offices where there are a multitude of CP/M machines and a few BBCs, MULTIFORM Z80 will prove to be invaluable for transferring data between the various CP/M machines.

**MULTIFORM Z80** (including utility disc, library disc and manual) **£299 + £4 p&p**

(When ordering please specify the type of DFS, MULTIFORM Z80 will be used with)

**SPECIAL MULTIFORM UTILITY** to read and write to IBM PC Disc. **£75 (d)**

## *CP/M SOFTWARE FOR TORCH & ACORN Z80 PROCESSORS*

**We can now supply almost any CP/M based software package in a format suitable for the Torch Z80 and Acorn Z80 second processors. Phone for details on prices for popular packages for IBM**

**Please phone for our new professional software catalogue**

**WORDSTAR PROFESSIONAL** The advanced word processing package comprising of WordStar, MailMerge, StarIndex and SpellStar, a total combination offering substantial savings on individual prices. WordStar is the best selling word processing program on the market. Extensive operator aids include a comprehensive friendly manual, step-by-step training guide, command cards, on-screen menus. Spellstar checks text files against its 20,000 word-plus dictionary. You can both add to the dictionary and create specific supplementary ones. Mailmerge is ideal for mailing applications. It enables the fast production of personalised form letters, mailing labels, invoices, etc. StarIndex creates alphabetical indexes, tables of contents, paragraph numbering etc.

**WORDSTAR PROFESSIONAL £310 (a)**
**WORDSTAR £275 (a) WORDSTAR Upgrade to W/S Prof £195 (a)**

**DBASE-II** Undoubtedly 'The Database', can be used for an almost limitless number of business applications, ranging from mailing list preparation through to running accounting ledgers and payrolls. An on-disc tutorial takes you from setting up a simple file all the way through to setting up custom screens and reports. Automatic calculations may be performed on data. Fields or entire databases may be modified or replaced with single, English-like basic commands; Dbase-II can therefore be used by general personnel having no programming knowledge. It can be tailored to suit a variety of professions and individual needs, with files such as accounting, payroll, time billing, job costing, scheduling and mailing lists. It can access several files at a time. It is fast, flexible and powerful.

**SAGE ACCOUNTS:** This package has been designed for the smaller business, for the user who is unfamiliar with computers but wanting or needing to computerise the bookkeeping and accounting functions. Sage is easy-to-learn and easy-to-use and is complete with a full tutorial booklet and a free manufacturers 90-day 'Hot-Line' support. It is a truly integrated package (all on one disc!) and covers Sales, Purchase & Nominal Ledgers, with a capability of handling up to 9999 accounts per ledger. It will handle all your Sales and Purchase invoices and can easily generate account & management reports. **£375 Sage plus (£695)** for the larger business, and **Sage Payroll (£195)**

Other packages available include PRO-PASCAL, CIS-COBOL, Supercalc II, MACRO-80 etc. Please telephone with your requirements.

**A.T.I. Trainers** — these superb interactive training discs simulate the package being studied. A unique screen technique provides a friendly interaction — in the upper area, a faithful reproduction of the screen is displayed, while at the bottom, a series of prompts and explanations lead the student through the exercise. ATI trainers available include Wordstar, dBase-II, dBase-III, Multimate, Multiplan, Word at **£75 (b)**. Please phone for other trainers.

**TORCH GRADUATE IBM SOFTWARE:** We are able to supply most popular software packages including: WORDSTAR, WORD, EASY-WRITER, DBase-II & III, LOTUS-123, VISICALC, SAGE etc. Please telephone with your requirements.

## *PROFESSIONAL SOFTWARE PUBLICATIONS*

| | |
|---|---|
| Wordstar made easy | £16.95 (c) |
| Introduction to Wordstar | £17.95 (c) |
| Wordstar Handbook | £11.95 (c) |
| dBase-II for the first time user | £16.95 (c) |
| Understanding dBase-II | £22.95 (c) |
| Understanding dBase-III | £22.95 (c) |
| Multiplan Made Easy | £18.95 (c) |
| Multimate Complete Guide | £16.95 (c) |
| ABC of LOTUS 123 | £15.95 (c) |
| The RS232 Solution | £17.95 (c) |
| CP/M Bible | £15.95 (c) |
| Soul of CP/M | £14.95 (c) |
| CP/M Handbook | £14.95 (c) |
| Mastering the CP/M | £17.95 (c) |

(no VAT on books)

# TECHNOMATIC

**01-208 1177**

**BBC Computer & Econet Referral Centre**

**MAIL ORDER**
17 Burnley Road
London NW10 1ED

**RETAIL SHOPS**
15 Burnley Road
London NW10 1ED
Tel: 01-208 1177
(close to Dollis Hill ⊖)

**West End Branch**
305 Edgware Road
London W2
Tel: 01-723 0233
(near Edgware Road ⊖)

**TECHNOLINE**
24 hour Viewdata Service 01-450 9764

Orders welcome from government depts & educational establishments.

**All prices ex VAT**
**Prices are subject to change without notice**

Please add carriage
(a) £8 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00.

## COLOUR MONITORS

RGB MONITORS *(all monitors supplied with a BBC lead)*

| | | |
|---|---|---|
| **1431** 14″ RGB Std Res | 452 × 585 pixels | £179 (a) |
| **1451** 14″ RGB Med Res | 653 × 585 pixels | £229 (a) |
| **1441** 14″ RGB Hi Res | 895 × 585 pixels | £375 (a) |

**MICROVITEC 14″ RGB/PAL/Audio**

| | | |
|---|---|---|
| **1431AP** 14″ Std Res | 452 × 585 pixels | £199 (a) |
| **1451AP** 14″ Std Res | 653 × 585 pixels | £275 (a) |

*The above monitors are available in plastic or metal case.*

**MICROVITEC 20″ RGB/PAL/Audio**

**2030CS** 20″ Std Res £380 (a) **2040CS** 20″ Hi Res £685

**TAXAN 12″ RGB:**

**Super Vision III** with amber/green option £345 (a)

**MITSUBISHI XC1404 14″** Med Res RGB:

BBC/IBM Compatible. A new monitor with etched dark screen with both brilliance and contrast controls giving sharp graphics and text display. £249 (a)

## TOUCHTEC-501

Designed for use with Microvitec metal cased monitors, and using the RS-423 socket, this unit brings genuine touch-screen operation to your BBC. Ideal for the educational market. Supplied with a users handbook and utilities disc containing starter programs and development software.

**Touchtec 501** £260 (b)

## EPROMER II




A sophisticated eprom programmer that handles the full range of popular single rail eproms (incl 27256) and allows the user full control of the programming process.

Its powerful menu driven software makes the programming of eproms simple, efficient and eliminates the need to have fiddly switches for selecting eprom types, programming voltage or method. The features include:

* Integral power supply ensures no power drain from the computer.
* Interfaces through 1 MHz bus, fully buffered.
* Clear and simple instructions displayed on the screen make the programming easy for both the first time user and the advanced user.
* Eproms upto 16K (27128) programmed in single pass (27256 in two passes).
* Selectable programming voltage 25/21/12.5V
* Selectable programming method — normal or high speed algorithmic. High speed programming enables 27128 to be programmed in just over 2 mins. Normal programming skips addresses with FF data to increase programming speed. Automatic verification on completion of programming.
* User can select any section of the eprom from a single byte to its full address range to Blank Check/Read/Program/Verify enabling program development/changes very simple.
* Full screen editor with HEX/ASCII input.
* Data input from keyboard/Tape/Disc/Eprom.
* Software interface for integration of user's special requirements.
* Constant display of all options selected.
* Several BBC BASIC programs can be entered on a single eprom.
* Checksum facility allows for easy identification of programmed roms.
* Enter OS Commands from within the epromer program.

**EPROMER II** with Manual & Software on disc £99 (b)
ROM based software £10

## UV ERASERS

**UV1T** Eraser with built-in timer and mains indicator. Built-in safety interlock to avoid accidental exposure to the harmful UV rays. It can handle up to 5 eproms at a time with an average erasing time of about 20 mins. £59 (b)

**UV1B** as above but without the timer. £47 (b)

## MONOCHROME MONITORS

**KAGA**

**KX1201G** 12″ HI-RES green etched screen £90 (a)
**KX1203A** 12″ HI-RES amber etched screen £105 (a)

**PHILIPS**

**BM7502** 12″ HI-RES green screen £75 (a)
**BM7522** 12″ HI-RES amber screen £79 (a)

## MONITOR ACCESSORIES

Microvitec Swivel Base (14″ plastic monitors) £20 (c)
Taxan Swivel Base for mono monitors with integral clock £22 (c)
Philips Swivel Base £14 (c) Monitor Plinth £13.50 (c)
Double Tier Plinth for flat drive, computer and monitor £19.50 (c)
Taxan RGB Cable £5 (d) Microvitec RGB Cable £3.50 (d)
Monochrome BNC/PHONO Cable £3.50 (d)

## REAL-TIME CLOCK CALENDER




A low cost unit, allowing the facilities of units costing far more. Built to professional standards, it opens up the total spectrum of Real-Time applications. Possibilities include desk diary/planner, calender, continuous display of on-screen time and date information, automatic document dating, precise timing and control in scientific applications — its uses are endless. Simply plugs into the user port — battery backup is supplied as standard. A full manual as well as extensive software including a simple demonstration diary/planner application program on disc. £21 (d)

## ROM/RAM EXPANSION SYSTEMS

**ARIES B-32 BOARD:** Features 32K of RAM and a 16K ROM socket. RAM can be configured as 20K or 16K as shadow RAM and 12K or 16K or 32K sideways RAM. New commands include comprehensive sideways ROM/RAM management system, simplified direct access to screen RAM and the ability to move/swap the contents of any area of memory. ROM/RAM management system allows RAM allocation, list ROMs, load sideways RAM, disable ROMs, and extend any buffer including printer buffer.

**AIRES B32** RAM BOARD £79 (d)
**ARIES B12** ROM BOARD £40 (d)
**ARIES B12C** Adaptor Board for B12 £7.50 (d)

**ATPL SIDEWISE ROM EXPANSION BOARD** A well constructed expansion board, simple to instal and requires no soldering. All buses are buffered. It allows full sideways rom expansion to 16 ROMs. One socket has been split into two 8K sockets to allow the use of 8K CMOS RAM. Battery backup option allows data retention in the RAM when the computer is switched off. Several link selectable options including write protect for the RAM. ATPL Board £37 (d) Battery Backup Kit £18 (d)

**ATPL Board for BBC PLUS** 10 × 16K ROMs £29 (d)

**COMPUTER VILLAGE** CV-16 Rom Board £38 (d)

A neatly designed, simple to instal board allows full sideways rom expansion on the model B. Two sockets for 8K CMOS RAM allow a total of 16K for which battery back is fitted as standard. £35 (d)

**RAMROM-15** The advanced sideways ROM/RAM expansion system. This is an external unit, using high quality construction, attractively packaged in a BBC coloured metal case, allowing easy access to all the sockets. No soldering is required. Allows 11/12 additional sideways ROMs to be fitted with an option of up to 16K sideways RAM. All commonly available RAM can be used i.e. 4801/6116/6264 or xx128. Battery back-up fitted as standard. For development work and further expansion, most of the 6502 processor signals are available. Supplied with utility disc and full instruction manual. £79 (b)

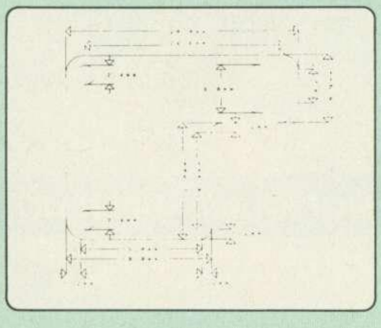
*(Above boards are for use with standard BBC computer and not compatible with B plus unless specifically mentioned)*

# NOVACAD
# Computer Aided Draughting for the BBC Micro

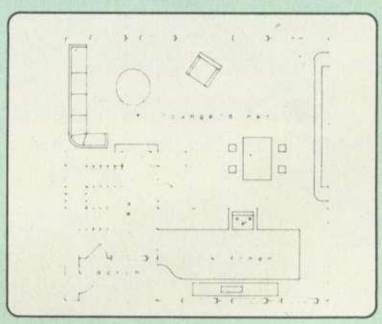
**A sophisticated CAD package with unique facilities which until now were confined to custom built CAD packages.**

**Whether you want to draw a complex electronic circuit diagram or plan your new kitchen or simply draw a cube NOVACAD will help you do it better and more easily.**

**All you need is a BBC micro model B fitted with Acorn DFs and a single disc drive. If you have a 6502 2nd processor and a dual disc drive NOVACAD's capabilities are further enhanced.**



* Very user friendly with all commands and controls from the keyboard. Special windowing techniques make available to the user almost one million dots allowing a lot more detail to be put on the drawing than one would normally expect the BBC to be capable of. The drawing can be 4 windows across and 5 up.
* Libraries of user defined ICONS such as electronic symbols can be created easily and edited even in the middle of drawing another diagram. ICON size is not limited to a number of pixels. An ICON can contain up to 500 lines, so complete drawings or sections of large drawings can be saved as ICONS for use with other drawings.
* ICONS can be called by name from a library into any part of the diagram and can be moved, enlarged, reduced, rotated in 90° steps and have mirror images made before being finally positioned.
* Shapes can be copied on the screen as many times as required.
* The zoom facility allows the user to magnify any section of a drawing by up to 20 times to make it easier to insert details.
* Horizontal and vertical displacements can be measured in any user defined scale.
* Any two colour can be used in mode 4.
* Up to '8 levels' can be used to produce multi layer drawings, and then user can decide which levels are to be displayed. This can be particularly used in pcb drawings, architectural drawings with details of the services behind the walls displayed only when required and many other such applications.
* Text can be added at any position vertically or horizontally.
* Use of 2nd processor will allow use of any 4 colours, higher pixel density drawings and considerably faster operation. (NOVACAD without the 2nd processor is faster than any other CAD package we have seen for the BBC).
* Powerful delete facilities allow deletion of single lines or whole sections with minimum of key presses.
* Printer dump for Epson compatible printers incorporated in the software which allows a full or a sectional screen dump.
* An optional plotter utility contains a plotter configuration program allowing the user to configure a program for his plotter. Pre-configured programs are included for a number of popular plotters.



**NOVACAD will prove to be an invaluable teaching aid in technical schools and colleges and for anyone involved in draughting it will be an ideal labour saving tool.**

**NOVACAD package with 16K ROM, Utility disc and a comprehensive manual £79 (c)**

**Novacd compatible with Tracker Ball/AMX Mouse £99 (c)**

**Stand Alone Mouse for use with NOVACAD £34 (d)**

**Upgrading of existing ROMs and DISCS £20 (d)**

**Plotter Utility Program £28.50 (d)**

# NEW META VERSION THREE

Now Available

* **Assembles for even more processors**
* **Now over 70k long on 2 Roms and 2 Discs**
* **Dozens of new options, features and directives**

The Original META system sold hundreds worldwide; it's being used in Universities, Polytechnics, British Telecom, the BBC, the MOD etc etc.

Now there's an even better version. It comes on two Roms and two Discs for your BBC or BBC+ (Master soon) and gives you complete Editing and Assembly facilities for all the listed processors:

| | | |
|---|---|---|
| 1802 | 68HC11 | 6808 |
| HD 64180 | 68000 | 6301 |
| Z80 | 8048 Series | 6303 |
| 6502 (including *all* CMOS varients) | 8051 Series | 6305 |
| | 8080 | 6801 |
| 65C812 | 8085 | 6803 |
| 65C816 | Z8 | 6805 |
| 6800 | 68120 | 6804 |
| 6802 | 68121 | 6809 |

META uses the appropriate standard mnemonics for each, eg. LD (HL) 0ABH in Z80 and MOVE. B DO, $S0 (A5, D6.L) in 68000 etc.

Full nestable Macro facilities are provided, and nestable conditional Assembly, (IF/ELSE/ENDIF), Modular source code (including parameter passing). True local and global labels, 32 bit labels and arithmatic (incl. MIL, DIV, AND, OR, XOR, SHL etc). 30 ways to send object code during Assembly, including Intel Hex, S.Record, Binary etc to Disc files, RS423, EPROM emulators etc, local reassembly and over 50 directives, including DS.X, DC.X, EQUX, FCB etc).

Incredible Wordwise-style Editor integrated in with Assembler; Search/Search-Replace, Block copy/delete, markers etc; dozens of special features and functions for Assembly code programmer. Fast and Friendly to use.

Plus special new serial Communicator Area with Complex Option page etc.

**Send for your 8 page datasheet on the META Assembler and the PORTAL EPROM Emulators. Set of disassemblers and Logic Analyser coming soon.**

**£145 (c)**

# TECHNOMATIC

**01-208 1177**

**BBC Computer & Econet Referral Centre**

**MAIL ORDER**
17 Burnley Road
London NW10 1ED

**RETAIL SHOPS**
15 Burnley Road
London NW10 1ED
Tel: 01-208 1177
(close to Dollis Hill ⊖)

**West End Branch**
305 Edgware Road
London W2
Tel: 01-723 0233
(near Edgware Road ⊖)

**TECHNOLINE**
24 hour Viewdata Service 01-450 9764

Orders welcome from government depts & educational establishments.

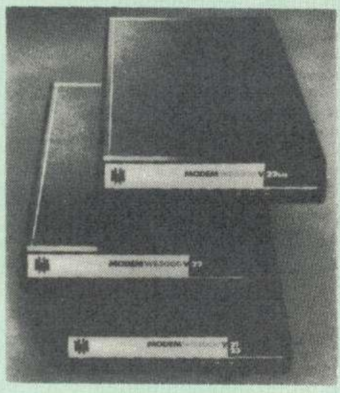
**All prices ex VAT**
**Prices are subject to change without notice**

Please add carriage
(a) £8 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00.

## COMMUNICATIONS

**MIRACLE WS3000 Range:** * A new, professional series of intelligent modems with full auto dial and auto answer facilities as standard. * HAYES protocols are implemented allowing the use of a wide range of well proven communications software. 'Plain English' command structure simplifies the use of the modem even for the first time user. * All models feature a centronics compatible printer port allowing direct output to a printer. * A line sharing facility that allows WS3000 to differentiate between calls intended for data, and those for speech. * An intelligent speed buffered RS232 port and a wide range of available data rates makes this one of the most powerful multi speed range of modems available. * Line noise filtering ensures error free transmission and reception of data on long or noisy lines. * Internal battery backup allows storage of 63 names and telephone nos. * This range of modems can be factory fitted with high security data access protection system. * Models V2123 and V22 can be factory upgraded to V22bis standard giving a single compact modem capable of data rates from 75bps to 2400bps.

APPROVED for connection to telecommunication systems specified in the instructions for use subject to the conditions set out in them.



**WS3000 V21/23:** This modem complies with the CCITT V21, V23 and Bell 103 standards and operates at CCITT standards for 300bps, 75/1200bps, 1200/75bps full duplex, 600bps and 1200bps half duplex, and the Bell standard for 300bps full duplex. **£295 (b)**

**WS3000 V22:** This modem operates on all V2123 standards plus V22 standard for 1200bps full duplex V22bis standard. **£495 (b)**

**WS3000 V22bis:** This modem operates on all V21/23 and V22 standards plus 2400bps full duplex. **£650 (b)**

**BBC Data Cable for WS3000 £6 (d)** Data cables for other micros available.

**MINOR MIRACLES WS2000** This highly successful world standard modem, having BT approval, covering V21, V23, (BELL 103/113/108 outside the UK) and including 75,300,600, 1200 Baud ratings. What possibly gives this modem its biggest advantage is its option of computer control. A 25Way RS232 input as well as possible computer controlled auto/dial/auto-answer makes this modem unique. **WS2000 £125 (c)** Data Cable **£7.**

**WS2000 Auto-Dial card:** includes an integral loudspeaker for monitoring of the phone line **£30 (d).**
BBC User Port cable (for modem control) **£4 (d)**

**WS2000 Auto-Answer Card £30(d).**
(Please note that the A/D & A/A Cards are still awaiting BABT Approval.)

**SKI KIT** (Allowing total control of the modem by your computer) **£10 (d)**

**DS1 Disc (for Commstar):** When used with the Auto-dial card, SK1 Kit, and a user port cable, this software will dial out to Prestel, enter your password etc. and leave you in Commstar. Will also store many bulletin board telephone numbers and protocols for autodialling **£10 (d)**

**GEC DATACHAT 1223 Modem:** An economically priced BABT approved modem complying with CCITT V23 standard capable of operating at 1200/75bps and 75/1200bps and 1200/1200bps pseudo full duplex. It is line powered does not require external power source. It is supplied with software suitable for connecting to PRESTEL, Micronet 800, Telecom Gold and a host of bulletin boards. **£86 (b)**

**DATA-BEEB** An advanced communication ROM from Miracle Technology. Its many features include both Viewdata (Prestel) and Terminal modes, Auto-Answer and Auto-dial for fully expanded WS 2000's etc. Macro facilities allow flexible use of its many facilities e.g. automatic dialling, log-on, going to a specific page, printing it, and going off-line, all in one operation. **£24 (d)**

## COMMUNICATIONS SOFTWARE

**CONNECT-3000** AN ESSENTIAL UTILITY FOR THE WS3000 OWNER — a dedicated control package specially written to optimise the potential of the WS3000 series of modems. It provides a friendly menu-driven 'front-end', for the superb but rather complex multitude of facilities of the 3000 — no need to remember register nos. or complex command codings etc. It provides easy control for Prestel, Terminal, Auto-Answer/Dial use, while a unique 'default' facility provides automatic, pre-defined screen presentation. Works in conjunction with ALL communication software, including Commstar, Data-Beeb, Termulator, Termi, Communicator etc.
**40/80 Disc** **£16.50 (d)**

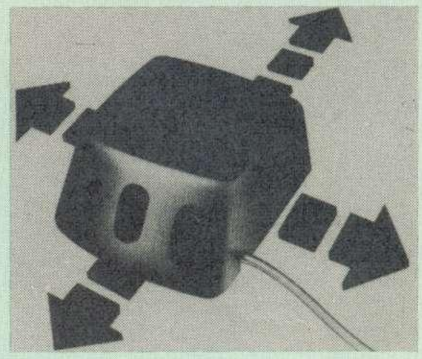
**TERMULATOR** An advanced terminal emulator on a 16K Rom. Emulations include VT52/100, Tektronix 4010 etc. Allows a BBC to be used as a terminal for almost any mainframe computer or computer network. **£25 (d)**

**COMMUNICATOR** This is a full 80 col VT100 terminal emulation program on 16K eprom. It is a more advanced program than TERMI and features easy to follow screen menus. The rate at which data is sent or received is easily set up with rates up to 19200 Baud with 80 column text. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Communicator is not suitable for PRESTEL). **£49 (d)**
RS232 Solution (Book) **£15.95 (c)**

**COMMSTAR** An ideal communications rom for both Prestel and bulletin boards. Facilities include Xmodem, clock etc. **£28 (d)**

RS232 SolutionBook **£17.95 (c)**

## AMX MOUSE with SUPERART



The mouse will now be available with enhanced software, the 'SUPER ART' which is compatible with 6502 2nd processor, the ARIES RAM board, BBC+ shadow mode, tape and ACORN DFS and ADFS. Allows full use of colour in mode 1. Disc users can create colour pictures in A4 size with dot pattern editing, use of icons, additional text styles, superb zoom in colour.
There is a variety of optional software to make the mouse one of the most versatile peripherals that can be added to the BBC micro.

**AMX Mouse with Super Art** **£67 (d)**
**AMX Super Art Package on its own** **£43 (d)**
**AMX PAGEMAKER** provides a high resolution A4 Typesetting and Artwork system. **£43 (d)**
**AMX 3D ZICON** will let you transform three dimensional vector data and translate them into 3D on screen graphics. **£21 (d)**
**AMX DATABASE** is a new filing system with 1000 records per file and unlimited number of fields per record. **£21 (d)**

## RB2 TRACKER BALL

A precision built tracker ball. Software allows RB2 to function instead of cursor keys, for word processing, CAD/CAM etc. Software includes a graphics/CAD package.
**RB-21 (with 'icon artmaster').** **£59 (c)**

## MERLIN

NEW

**A new advanced disc-users utility.**
This 16K rom-based utility is one of the most comprehensive packages offering many unique features. Its over 50 commands are all fully tube compatible. It is supported by a 100 page manual. This package is aimed primarily at disc users with the BBC B and the B plus. (Master version available soon).
**Major Features:**
**DISC UTILITIES** including:
Disc editor, with search, verify and repair utilities. Clone utility, backup/edit of protected discs. A special formatter to speed up disc accesses. Tape archive of discs and tape/disc transfer utilities. Screen compaction. Vastly improved copy and backup facilities.
**MACHINE CODE UTILITIES** including:
Memory search and edit, disassembly with 65C02 codes supported, switching between roms, main memory and tube, examine fx and osbyte calls.
**MERLIN** **£37.50 (b)**
Send for the detailed command listing.

# FIRMWARE AND SOFTWARE

## DATABASE MANAGEMENT SYSTEMS

**VIEWSTORE** An exciting, powerful database with many features: Display can be 'spreadsheet' or 'card-layout' type. Powerful selection and sorting utilities. Any screen mode can be used. Data can be sent to View and ViewSheet. Maximum file size 4096MByte! Maximum record size 60K. **£39 (d)**

**STARdataBASE** A fast machine code, true random access database program in a 16K Eprom. Up to 4096 records in a file, up to 69 fields in a record. The record layout is totally user defined. Entirely menu driven — thus very user friendly. Extremely fast searches are possible using the Keysearch facility. Mailmerging from View and Wordwise, and address labelling. **£49 (d)**

**MASTERFILE II** The new version of the popular general purpose file management system allowing large amounts of information to be stored and processed. It allows up to 17 fields per record, and the only limitation as to the number of records is the capacity of the disc. This latest version features many new facilities including use with WORDWISE/VIEW **£17.00 (d)** Disc (80 or 40T).

**GEMINI'S DATAGEM** **£59 (c)**

## WORD-PROCESSORS

**VIEW** Acorn's version V2.1 word processor rom. **£39 (c)**

**VIEW VERSION V3.O** Also compatible with BBC + Complete with Printer Driver Generator. **£60 (c)**

**HI VIEW** Disc based version of VIEW word processor for use with the 6502 2nd processor. Allows 47K of user memory. **£36 (c)**

**VIEW INDEX** Disc based program to create an index from VIEW text files. Ideal for anyone concerned with writing extensive reports or books. **£10 (d)**

**VIEW PRINTER DRIVER GENERATOR:** This driver generator will enable you to produce a driver to suit your printer and also let you view the text as it will appear on the paper including condensed, italics, sub and super script modes. **£8 (d)**

**VIEWSPELL:** A rom based spelling checking utility with a dictionary of 70,000 words on disc. Additional/specialised dictionaries can be created. Facility to search the dictionary for words beginning with or ending with certain characters. **£52 (d)**

**WORDWISE** **£28 (d)**

**WORDWISE PLUS** The new advanced Wordwise on a 16K eprom, for the more specialised users who require added features and flexibility. Four new programs are also supplied allowing mail-merging, index generating, two-column text printout and continuous processing. **£45 (d)**

**WORDEASE** A rom based utility for the Wordwise plus. **£24.50 (d)**

**SPELLCHECK III** A 16K rom based program for View and Wordwise plus. Contains 2000 words on the rom and 6000 (expandable to 17000) on disc. **£31 (d)**

**EDWORD II** **£43 (a)**

## SPREADSHEETS

**VIEWSHEET** Acorn's spreadsheet provides 255 columns and 255 rows and will operate in any mode. Windows can be created which can then be rearranged to provide any print format required. Function keys provide for easy entry of commands. Printer control codes can be used using the printer driver. Fully compatible with VIEW and the 6502 2nd Processor. **£39 (d)**

**VIEWPLOT:** A disc based Linear graph/barchart/piechart plotting program. **£25 (d)**

**INTERSHEET** The new spreadsheet from Computer Concepts. Many advanced facilities including 105 character display, several spreadsheets may be used at once, may be used with View & Wordwise etc. etc. **£45 (c)**

**INTERCHART** Graphics Package for the Intersheet. **£30 (d)**

**ULTRACALC** **£49 (d)** **QUICKCALC** **£14.50 (d)**

## LANGUAGES

**META-ASSEMBLER:** For full details please see page 6 of this advertisement.

**Meta-Assembler £145 (c)**

**ACORN P-SYSTEM** A portable operating system supplied complete with USCD PASCAL and FORTRAN 77. **£259 (b)**

**6502 DEVELOPMENT PACKAGE** A Macro-Assembler with utilities for use with the 6502 2nd Processor. Enables the serious programmer to develop large programs in assembly language. **£39 (d)**

**ACORN MICRO-PROLOG:** The logic programming language seen as the language for programming in the future and used extensively in the artificial intelligence field. A simple 'front end' is supplied to make syntax more user friendly for new users. 16K Rom, manual and extension modules. **£62 (c)**

**ISO-PASCAL** Acorn's full implementation of International Standard Pascal on two 16K ROMs. Disc Version for use on 6502 2nd Processor also supplied. Comprehensive manual. **£48 (a)**

**ISO PASCAL Stand ALONE GENERATOR:** Utility to convert programs produced using ISO PASCAL for stand alone applications. **£28 (d)**

**ACORN LOGO** A full implementation of the Logo language from Acornsoft. Supplied as two ROMs with a tutorial course and technical manual. **£49 (b)**

**LOGOTRON** logo **£56 (c)**

**BCPL** A full implementation of the BCPL compiler language consisting of the language of ROM, disc containing the BCPL compiler, a screen editor, a 6502 assembler, other utilities and programming aids and examples of BCPL code and a 450 page manual. **£46 (b)**

**BCPL CALCULATIONS PACKAGE** Supplied on disc, it supports floating point, fixed point and fast integer calculations. It includes the BCPL calcultion files, example files and a comprehensive user guide. **£17.30 (d)**

**BCPL STAND ALONE GENERATOR** **£39 (d)**

**Acorn LISP Rom, Acorn FORTH Rom, Acorn COMAL, (each) £39 (d)**

**MICROTEXT** A frame based authoring system from National Physical Laboratory for interactive computer tutoring. Disc based. **Disc £49 (c)**

**G:FORTH** An advanced implementation of FORTH which follows the 79-Standard specification on a 16K ROM and has a full double number extension set. **£39 (d)**

**OXFORD PASCAL** A fast, compact P-Code compiler, that fully utilises BBC Graphics and sound, contains a powerful editor, and produces 'standalone' software. (Specify 40/80T) **£35 (c)**

## UTILITIES

**ACCELERATOR**......... £49 (d)
**ACORN BASIC EDITOR**...£24 (d)
**BROM**........................£28 (d)
**SLEUTH**........................£24 (d)
**TOOLKIT plus**.............£31 (d)
**EXMON-II**.....................£22 (d)
**HELP II**....................£27 (d)
**DISC DOCTOR**..........£26 (d)
**DISCMASTER**..........................£18 (d)
**ACORN GRAPHICS ROM GXR.** £23 (d) (specify BBC B or BBC B PLUS)
**COMPUTER CONCEPTS GRAPHICS ROM**..................£22 (d)
**PRINTMASTER**..........................£26 (d)
**DUMPMASTER II** 16K rom with dump routines and a variety of features for about 40 different printers. **£26 (d)**
**FONTWISE**..........................£10 (d)
**HERSHEY CHARACTER FONT GENERATOR**.............£18 (d)
**ICON MASTER**..........£29 (d)
**STAND ALONE MOUSE**.........£34 (d)
**BILLBOARD**..............£18 (d)
**STUDIO EIGHT**..........£19 (d)
**ACORN'S CREATIVE SOUND**.................. £15 (c)
**CC SPEECH ROM**.......£28 (c)
**ACORN'S SPEECH PROCESSOR ROM**......£15 (d)
**ROMIT**.......................£29 (d)
**PROGRAM BUILDER**..£18 (d)
**REPLICA III**...................£12 (d)
**DATABEEB**...............£24 (d)
**COMMUNICATOR**......£49 (d)
**COMMSTAR**...............£26 (d)
**TERMULATOR**..........£25 (d)

When ordering software on disc please specify track format (40/80)

# BOOKS

**No VAT on books; Carriage (c)**

**CPU/ASSEMBLY LANGUAGE BOOKS**

| | |
|---|---|
| 6502 Assy Lang Prog | £19.95 |
| 6502 Programming | £16.95 |
| 8086 Book | £23.95 |
| Advanced Z80 M/C Prog | £12.95 |
| Programming the 8086/88 | £16.95 |
| Programming the 6809 | £15.95 |
| Programming the Z80 | £19.95 |

**PROFESSIONAL SOFTWARE PUBLICATIONS**

| | |
|---|---|
| CP/M Handbook | £14.95 |
| Mastering the CP/M | £17.95 |
| CP/M Bible | £15.95 |
| Soul of CP/M | £14.95 |
| Wordstar Made Easy | £16.95 |
| Intro to Wordstar | £17.95 |
| Wordstar Handbook | £11.95 |
| dBase II for the 1st Time User | £16.95 |
| Understanding dBase II | £22.95 |
| Understanding dBase III | £22.95 |
| Multiplan Made Easy | £18.95 |
| Multimate Complete Guide | £16.95 |
| ABC of LOTUS 123 | £15.95 |
| The RS232 Solutions | £17.95 |

**LANGUAGES**

| | |
|---|---|
| Understanding UNIX | £18.45 |
| UNIX User Guide | £19.95 |
| The UNIX Book | £7.50 |

# TECHNOMATIC

**01-208 1177**

**BBC Computer & Econet Referral Centre**

**MAIL ORDER**
17 Burnley Road
London NW10 1ED

**RETAIL SHOPS**
15 Burnley Road
London NW10 1ED
Tel: 01-208 1177
(close to Dollis Hill ⊖)

**West End Branch**
305 Edgware Road
London W2
Tel: 01-723 0233
(near Edgware Road ⊖)

**TECHNOLINE**
24 hour Viewdata
Service 01-450 9764

Orders welcome from government depts & educational establishments.

**All prices ex VAT**
**Prices are subject to change without notice**

Please add carriage
(a) £8 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00.

# EDUCATIONAL SOFTWARE

**We are pleased to announce that we now stock the full range of BBC Publications Educational software for the BBC computers. This software which is in many cases developed alongside radio and TV programs from the BBC Education Department, has all been tested in many schools, and by education experts to ensure the high quality one would normally expect from BBC. These packages supplement the class room learning by providing moving and colourful graphical displays which normally cannot be easily produced on the blackboard and help in ensuring clear understanding of a variety of subjects. The software has received wide acclaim from teachers, and in the educational press. All cassette programs transfer easily to disc, and all disc programs can be run on 40 or 80 track drives.**

## PRIMARY LEARNING

**ASTRONOMY**
Aimed at the 9-12 age group, programs include Phases of the Moon, Eclipses, Seasons of the Year, Planetary Motions and Lander which is a gravitationally accurate game. All programs feature colour graphics **£12 (d)**

**COMPUTERS AT WORK: THE WORK GAME**
Uses the technique of computer synchronised audio to illuminate two of the most important applications of computers — robotics and information technology. Includes a complete database program, tutorial on word processing principles, and robot control program driven by a logo-type language. **EC £13 (d)** **EC £17 (c)**

**DRAWSTICK**
For children aged 8 upwards allowing them to create pictures, charts, maps and diagrams. It is sufficiently sophisticated for use by older children and adults. Pictures are saved in a compressed form, and can be incorporated in your own programs. Uses keyboard or joystick. **£9 (d)**

**INTRODUCING GEOGRAPHY**
Four exciting graphic adventure simulations to bring geography to life for the 9-13 age group. River involves navigating a river's course to the sea. In Flight, you fly an aircraft round the world. Summit takes you up Mount Everest, and Nomad involves survival in the desert. **£17.20 (d)**

**MATHS WITH A STORY 1**
Four primary-level maths programs suitable for children of a wide range of abilities. Topics include symmetry, co-ordinates, and probability. **£9.50 (d)**

**MATHS WITH A STORY 2**
These further four maths programs are for the same age/ability range as pack 1, and cover similar topics, from different angles. **£9.50 (d)**

**NUMBER GAMES**
Six maths programs designed to please the eye and stimulate the mind of any active and adventurous child aged 8 upwards. **EC £8.65 (d)**

**USING YOUR COMPUTER**
A friendly and original introduction to computers using the computer synchronised audio technique. Written for a 8-12 year old but also suitable for any complete novice. Total of 80 minutes of audio material and 14 programs. **£26.00 (c)**

**WORD PLAY**
An elegant but simple program to introduce primary school age children to the concept of word processing. Search, delete, justify etc have small animal icons associated with them. Fun manual for small children. **£10.75 (d)**

## SECONDARY LEARNING

**ADVANCED LEVEL STUDIES: STATISTICS**
Six programs covering the central concepts and principles of statistics. Topics covered are Discrete Data and Binomial Distribution, Continuous Data and the Normal Distribution, Hypothesis testing and confidence intervals, Central Limit theorem and Estimation, Simulations, Correlation and regression. **£25 (d)**

**ADVANCED STUDIES: GEOGRAPHY**
Four programs examining aspects of social geography — traffic and town planning, drainage basin management and planning for industry. Users can alter the models. Details in the comprehensive manual. **£11 (d)**

**INSIDE INFORMATION**
Designed to provide a basic introduciton to information technology for young people and adults. The course assumes no prior knowledge of the subject and is suitable for use in secondary schools, further education colleges, ITeCs and adult education centre. This software can be used alone, or in conjunction with the BBC's Inside Information radio series. **EC £11 (d)**

**OPEN LOGO**
Developed by the Open University to provide a full implementation of Logo — the language of learning — for the BBC Micro. 2 × 16K ROMS and two detailed manuals (120pp and 300pp) **EC £61 (c)**

**SCIENCE TOPICS: WAVES**
A secondary level physics program allowing the student to learn about waves by displaying waveforms on screen. Parameters can be altered and the results observed immediately. **£15 (d)**

**SCIENCE TOPICS: RELATIONSHIPS**
A secondary level biology program giving a sophisticated simulation exercise for students, based on data from the World Health Organisation. You are malaria control officer for an African village, and you must use the right combination of drugs, pesticide and education to combat the disease. **£15 (d)**

**SCIENCE TOPICS: BONDING**
A secondary level chemistry program designed to reinforce and strengthen students' concept of the bonding of elements. Transfer and sharing of electrons are both shown graphically. **£15 (d)**

**SCIENCE TOPICS: ELECTROMAGNETIC SPECTRUM**
A secondary level graphical adventure designed to test your knowledge of the electromagnetic spectrum. You are lost in space, and you must build a radio, perform spectroscopic analysis etc. to complete the adventure. **£15 (d)**

**SCIENCE TOPICS: ELECTRONICS IN ACTION**
A secondary level program about using computers for control. The pack gives three simulations of control systems. Control is achieved using a subset of 6502 assembly language. A program editor is supplied. **£15 (d)**

**SCIENCE TOPICS: NEWTON AND THE SHUTTLE**
This secondary level interactive program in three parts follows the space shuttle from launch to recapture of a satellite in space. Students knowledge of Newtonian mechanics is tested at each stage. **£20 (d)**

**SCIENCE TOPICS: ECOLOGY**
This program allows students to take the part of groups who manage a nature reserve according to their own special interests. The object is to keep all groups satisfied. **EC £20 (d)**

**SCIENCE TOPICS: POLYMERS**
Students run a manufacturing company and must make decisions as to the best materials to use for their products. They compete with a computer run rival company. Two areas of manufacturing are featured — car parts and kitchen equipment. **EC £20 (d)**

**SECONDARY SCIENCE: MICROTECHNOLOGY**
This software for the 14-16 age group will help students understand certain fundamental concepts in basic electronics. The pack contains Logic and Resistor Tutors, a Servo circuit simulation and a Circuit Design program. **£7**

**SECONDARY SCIENCE: THE MOLE CONCEPT**
A computer synchronised audio program which explains definitions of atomic and molecular masses and attractively depicts molar equations. The audio track is written and presented by Fred Harris. **EC £17 (c)** **EC £13 (d)**

**SECONDARY SCIENCE: UNIFORMLY ACCELERATED MOTION**
A physics program which illustrates basic equations, uniform acceleration under gravity and the idea of terminal velocity. The medium is computer synchronised audio. **EC £ 17 (c)** **EC £13 (d)**

**VU-TYPE**
The popular 'sight and sound' touch-typing tutor using colour graphics. The layout and parameters can be altered. 23 exercises can be loaded from disc. **EC £16 (d)**

## GENERAL

**GAME CORE**
This software gives you all the information and intelligence routines you need to write simple and highly absorbing board games for your computer. **£9 (d)**

**MONITOR**
A professional tool for mahcine-code programmers, suitable for assembly language experts and beginners alike. It is also ideal for teaching assembly language. **EC £34 (d)**

**TOOLBOX 2**
25 programming aids for the BBC Model B. Book (essential) sold separately. Program include machine code monitor, disassembler, fast flood fill, sprite generator/mover, and many more. **£9 (d)**

**ULTRACALC 2**
An electronic spreadsheet program with all the necessary built-in features. Ideal for business and personal management. **£52 (d)**

**VU-TYPE PROFESSIONAL**
An enhanced and expanded version of Vu-Type including many 63 Pitman-approved exercises. **£19 (d)**

**WORD MOVER**
A simple text editor offering the basic facilities of a fully fledged word processor, especially suitable for network environments where ROMs are impractical. Includes a terminal emulator. **EC £9 (d)**

## BOOKS (No VAT)

**COMPUTER SPREADSHEETS**
Gives a detailed account of the operation and facilities of computer spreadsheets and discusses popular products such as Lotus 1-2-3, Visicalc and Ultracalc. **£7 (d)**

**INSIDE INFORMATION**
A straightforward and comprehensive guide for newcomers to the subject of Information Technology. Accompanying software and audio cassettes are also available. **£9 (d)**

**MASTERING THE DISC DRIVE**
A clear and concise guide to the BBC micro disc system. Suitable for beginners to computing or as a reference manual for experienced programmers. **£8 (d)**

**MASTERING MUSIC**
Explains how you can exploit the full music-making capabilities of the BBC Model B micro. **£7 (d)**

**THE BBC MICRO AND THE SMALL BUSINESS**
A book to introduce the lay person to the potential capabilities of the BBC Micro with specific application to the small business. **£6 (d)**

**TOOLBOX 2**
The book to accompany the utility software giving listings of the programs with helpful commentary and diagrams. **£11 (d)**

Disc    EC Network Compatible    Audio Cassette

# TECHNOMATIC

**01-208 1177**

**BBC Computer & Econet Referral Centre**

**MAIL ORDER**
17 Burnley Road
London NW10 1E

**RETAIL SHOPS**
15 Burnley Road
London NW10 1E
Tel: 01-208 1177
(close to Dollis Hill ⊖)

**West End Branch**
305 Edgware Road
London W2
Tel: 01-723 0233
(near Edgware Road ⊖)

**TECHNOLINE**
24 hour Viewdata Service 01-450 97

Orders welcome fr government depts educational establishments.

**All prices ex VAT**
**Prices are subject to change without not**

Please add carriage
(a) £8 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00.

# HINTS & TIPS

**Martin Phillips offers a few tricks to help with debugging and a way to split long programs up into smaller, more manageable, pieces to try to overcome the Beeb and Electron's lack of memory**

## SQUASHING THE BUGS

I have come to realise that most programs do not work first time; indeed most programs don't work the second or third times either! Just sitting and staring at the program or the listing usually offers very little hope of solving the problem.

If it's a program you've written yourself, it is often the silly things that cause the most trouble; if it's a magazine listing then it is usually a typing mistake such as 'O' instead of a '0', or missing out a line or part of a line.

The usual way of solving the problem is trial and error – keep changing bits and pieces until something happens, or keep comparing the typed-in program with the printed listing, hoping to spot the difference. This often works, but there's far more satisfaction to be had by being able to predict the part of the program where the fault is likely to be, and trying to spot it.

One usually gets a better understanding of programming on the way, and it's a process which gets easier with time. I get comments from readers who say that they hate having to debug programs, yet those same people will spend hours playing adventure games.

Debugging programs can be just as much fun, and very satisfying – equally it can be just as annoying and frustrating! There are, though, a few tricks to make the debugging process much easier.

- Always save copies of the program regularly, so that if something happens to the version you're working on, you can load in the previous one and only a part of the work will have been lost.

I always save programs with filenames that give a version number, eg, SAVE"PROG05". This is also useful when you get into a mess with the changes made, as you can retrace your steps back as far as necessary. If you've a printer and an unlimited supply of paper (printers are rather effective machines for wasting paper), it's not a bad idea to save a print out when saving to disc, and mark each print out with the version number.

- You should always put the ON ERROR statements in as REM statements until the program works. That way you can get some idea of what is going wrong. Once the program runs, the REM can be removed and the ON ERROR restored.
- Similarly, always REM any *FX200 call which disables the Escape key and alters the function of the Break key.
- If it's not obvious where a program is going wrong, use the STOP command.

Insert the word STOP at a point where you are fairly certain the program will run to, and then run the program, moving the position of the STOP through the program line by line (or a few lines at a time) until you come across the offending line. I usually put STOP at an in-between line number so that it's easy to delete and move on.

When a program stops because of an error, it's easy to miss the actual error or the error line. All is not lost, though. Simply type REPORT to see the error message again, and type PRINT ERL to find the line number. If the result is 'at line 0' with no error given, then the program has well and truly crashed. An example of when this can happen is with Basic 1 and the INSTR function: when the search string is longer than the string being searched, the program crashes and this cryptic error message is given.

- If you know an error exists in a certain piece of code, and the problem is a stubborn one, then define a function key to list that part of the code on the screen. For example if the fault in the code lies between lines 180 and 270 then program function key 0 as follows:

```
*KEY0 MODE7 |M |N LIST 180, 270 |M
```

(Or MODE6 for the Electron.)

This idea is especially useful when the function of the editing keys has been changed by *FX4 or the auto-repeat has been switched off. Another key (or the same one) can have the extra code:

```
*KEY1 *FX4,0 |M *FX12,0 |M
```

*FX4,0 sets the editing and cursor keys back to their normal editing functions, and *FX12,0 puts the key auto-repeat and delay back to its normal setting.

Using the function keys in this way can save a lot of typing (and therefore possible mistakes) and makes debugging much easier.

- A common error is 'No such variable'. Instead of having a vague look at the offending line of code, try to run the program. List the line and print out all the variables to find which one does not exist. This is very easy to do. An example program line of:

```
230 FOR J = start TO end STEP N
```

has three variables which need to be predefined: 'start', 'end' and 'N'. Therefore type:

```
PRINT start
PRINT end
PRINT N
```

and with luck the problem will now show itself. It's then a task of checking back through the program to find where that variable should have been defined. A common fault is a spelling mistake in the variable name, or capital letters where lower case should have been used. Sometimes all the variables give a value and you're almost back to square one, but now the fault is easier to spot – obviously one of the variables is not what it seems on the screen. Look at the following line.

```
230 FOR J = start TO endSTEP N
```

Here a space has been missed out, and the dreaded 'No such variable' message appears because the computer thinks that 'endSTEP' is a variable.

This technique is valuable with arrays, where things such as subscript errors can be very tricky to spot, and being able to print out what's stored in a particular array can be enlightening. A peculiar quirk of BBC Basic is that an element of an array can be printed in the same way as a normal variable after the program has run, but only if the program has not been edited.

As soon as a line of text is altered, the pointers for the array are lost and the elements cannot be printed out.

- If you have tracked a difficult problem down to a procedure in the middle of the program, and it takes ages to run the program to that point, then save the program, delete everything but the procedure and write a short dummy program call it up with the correct variables. I find this a useful technique when writing programs as I can test a possibly problematic procedure before putting it into the program. Several examples of this technique have appeared in Hints & Tips, where I present a listing with a short sample program to show how it runs – listing 1 and 2 on the yellow pages are good examples.
- When editing listings that have no space between the line number and the actual listing, it's a good idea to use LISTO 1.
- The error message routines in BBC Basic are not too bright, and they are easily fooled. Either the error message itself can be incorrect,

or the line number given can be different from the line where the error actually is.

PRINTTAB(3,4) "HELLO"

will print "HELLO" near the top of the screen, but if the TAB statement is missed out:

PRINT (3,4) "HELLO"

the error message 'Missing)' is given – obviously incorrect as it's the statement TAB that's missing. When this error occurs, count the number of right and left brackets in the line – they must be equal.

It is possible to have an error line different from where the error occurred; ie, the OSCLI routine needed by Basic 1 users:

```
10 DIM A 50
20 X% = A MOD 256
30 Y% = A DIV 256
40 $A = "HELP"
50 CALL &FFF7
```

When run this lists all the ROMs in the machine – it's the same as typing *HELP, except it's been called from within a program. If a mistake is made in line 40 thus:

```
40 $A = "HELPP"
```

then an error message is given, not at line 40, but at line 50. In this example it is easy to find the problem, but when the OSCLI routine is a procedure called from several points in the program, finding the error can take some time. A common example occurs with the READ and DATA statements. The following program reads five numbers, stores them in an array and also prints them on the screen.

```
10 DIM A(5)
20 FOR N% = 1 TO 5
30 READ A(N%)
40 PRINT A(N%)
50 NEXT
60 :
70 DATA 1,2,3,4,5
```

However, if a mistake is made in the DATA statement, for example:

```
70 DATA ,1,2,3,4,5
```

the error message says:

No such variable at line 30

● Errors are often very difficult to spot when they are in long multi-statement lines. The solution here is to split these lines up so each statement is on a different line, for example:

```
10 DIM A(5):FOR N% = 1 TO 5:READ
A(N%):NEXT
20 . . .
```

can be split up to become:

```
10 DIM A(5)
11 FOR N% = 1 TO 5
12 READ A(N%)
13 NEXT
20 . . .
```

This is where it helps to have program lines numbered in tens.

## PROGRAMS IN PIECES

A limitation of the BBC micro and Electron is the lack of memory when using graphics. In modes 0, 1 and 2 there is less than 5k when using discs. This has been overcome to some extent with the Master and BBC B+ with shadow modes, but can still cause many difficulties. However, careful program design can often overcome this limitation, and even have several advantages. For instance, imagine writing a program on a 512k machine and having perhaps 100k of program to type in from a listing and then debug!

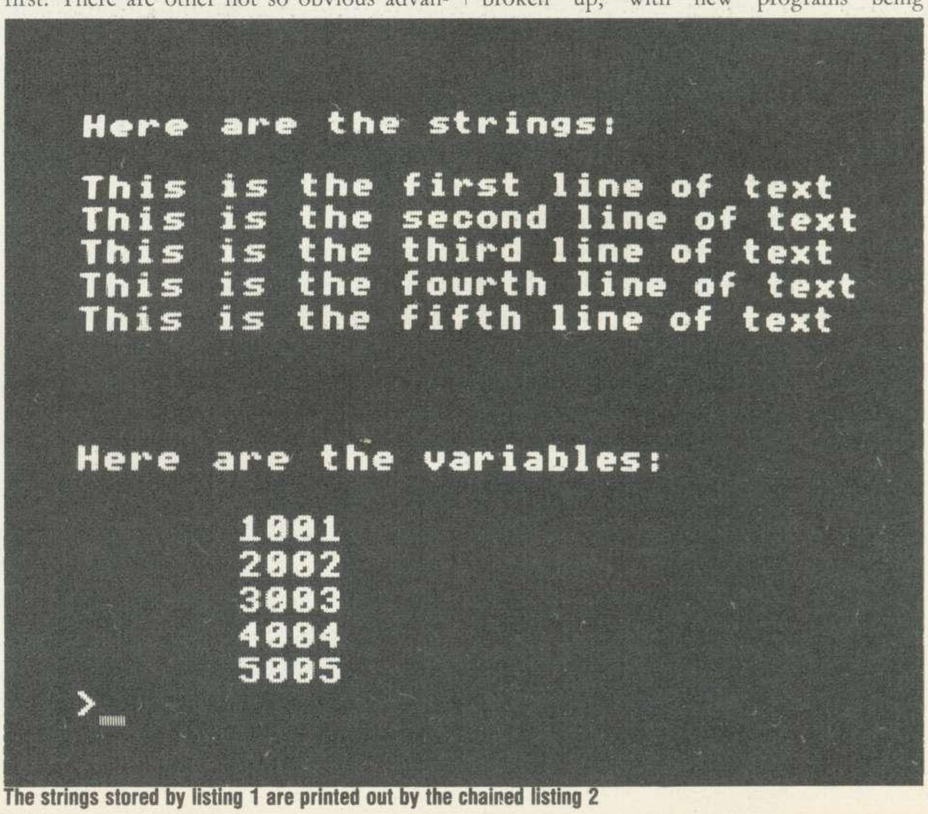
By now most readers will be familiar with the idea of procedures, and how they are able to break a program up into manageable chunks so that each can perform a specific function. This makes understanding the program much easier, and enables problem areas to be pinpointed quickly and errors cured.

There is a technique whereby some procedures can be stored on disc and pulled into the program as and when required, but this needs very careful planning, and can be quite difficult to debug.

A simpler approach is to divide a long program which uses graphics into several shorter programs, if possible, so it's even easier to follow and sort out any difficulties. A simple example is in the use of instructions, which can be given in a separate program which loads in first. There are other not so obvious advantages to this approach: for instance, BBC Basic does not do much 'garbage' collection so that in a long program a lot of memory can be taken up with spaces reserved for variables, strings and arrays that are no longer required but which the computer does not clear out. Then if memory is tight, after the program has run for a bit it crashes with the dreaded 'No room' error message. However, if the program is broken up, with new programs being

```
   10 REM Hints & Tips - listing 1
   20 REM by Martin Phillips
   30 REM for BBC B/B+/M/E
   40 REM (c) Acorn User May 1986
   50 :
   60 MODE 6
   70 PROCinit
   80 PROCstore
   90 CLS
  100 PRINTTAB(10,10)"Press space to loa
d"
  110 PRINTTAB(13,11)"next program"
  120 REPEAT:UNTIL GET=32
  130 CHAIN"H+T2"
  140 :
  150 DEF PROCinit
  160 DIM A$(5),B(5)
  170 C%=&3000
  180 A$(1)="This is the first line of t
ext"
  190 A$(2)="This is the second line of
text"
  200 A$(3)="This is the third line of t
ext"
  210 A$(4)="This is the fourth line of
text"
  220 A$(5)="This is the fifth line of t
ext"
  230 B(1)=1001
  240 B(2)=2002
  250 B(3)=3003
  260 B(4)=4004
  270 B(5)=5005
  280 ENDPROC
  290 :
  300 DEF PROCstore
  310 FOR N%=1 TO 5
  320 $C%=A$(N%):C%=C%+1+LEN(A$(N%))
  330 !C%=B(N%):C%=C%+4
  340 NEXT N%
  350 ENDPROC
```

**Listing 1. Defines five strings and stores them . . .**




**The strings stored by listing 1 are printed out by the chained listing 2**

CHAINed in as required, all this space is cleared out when the new program is CHAINed. Also, as there will be fewer variables, strings and arrays in a short program, there will be less of a problem with garbage collection anyway.

Splitting up programs into smaller programs can create problems, though. The main one is, how does one transfer data from one program to the next? If there are just a few variables, this is easy. The resident integer variables A% to Z% are not cleared when a new program is loaded, so 26 integer variables can easily be passed to subsequent programs. How can one pass strings and even arrays? Here is a technique which is very simple to operate and can be made to work in a wide variety of situations. All it does is to store integer variables, strings or arrays in 'safe' memory areas, so the next program can use the reverse process to 'load' them in again.

Listing 1 (opposite) is the program to define five strings and store them, together with five integer numbers, into memory locations starting at &3000. Listing 2 then retrieves the strings and numbers and prints them out. When trying this out, do remember to save each program first.

A string can be placed into memory by using the $ indirection operator, so $C% will place a string into memory starting at the memory location given by C%. It will also place a return character (&0D) after the string to indicate its end, which needs to be taken into account when incrementing C%. !C% will store an integer variable into four memory bytes starting at the location given by C%.

Listing 2 must be saved as H+T2 for the first program to be able to CHAIN it in. When it has loaded and displayed the variables and strings, try pressing CTRL-Break and then type OLD followed by RUN. The data should still be there, making it a very useful technique.

Perhaps the hardest thing is to find a 'safe' area of memory. This can be any part of memory which will not be overwritten by the program, or by the screen memory area, or by any memory area used by the computer itself. It is often advisable to avoid the first two bytes of a new page of memory if it is below PAGE, as the operating system often puts markers at the start of a page, eg, PAGE&900 (locations &900 to &9FF) are the RS423, sound and speech workspace. Often these are not used, so that this memory area can be used. The operating system puts a marker (in this case &10) at location &900, so to avoid any problems, it is best to start storing at location &902. Thus when Break is pressed, the first byte or two of data will not be corrupted.

```
 10 REM Hints & Tips - listing 2
 20 REM by Martin Phillips
 30 REM for BBC B/B+/M/E
 40 REM (c) Acorn User May 1986
 50 :
 60 PROCinit
 70 PROCretrieve
 80 PROCprint
 90 END
100 :
110 DEF PROCinit
120 DIM A$(5),B(5)
130 C%=&3000
140 ENDPROC
150 :
160 DEF PROCretrieve
170 FOR N%=1 TO 5
180 A$(N%)=$C%:C%=C%+1+LEN(A$(N%))
190 B(N%)=!C%:C%=C%+4
200 NEXT N%
210 ENDPROC
220 :
230 DEF PROCprint
240 CLS
250 PRINT''"Here are the strings:"'
260 FOR N%=1 TO 5
270 PRINT A$(N%)
280 NEXT N%
290 PRINT''"Here are the variables:"'
300 FOR N%=1 TO 5
310 PRINT B(N%)
320 NEXT N%
330 ENDPROC
```

**. . . to be retrieved and printed out by listing 2**

## FOR MASTERS

For those who've bought a BBC Master, and put a function keystrip into the new holder only to find that you cannot get it out again, try sticking a write-protect sticker on the keystrip to make a small tab – it can then be removed easily.

While on the subject of write-protect stickers, here is a tip for those who are also interested in car maintenance. If you have a timing light but it is not bright enough to show the markings on the flywheel, cut a notch in a silver write-protect sticker and stick that in the right place on the flywheel. This then reflects the light so that the timing can be set, the notch indicating the correct timing point.

When making a backup of a disc, always make sure that the disc to be copied has a write-protect sticker on it.

Vertical print is simple with the use of text windows. This program gives an example:

```
10 CLS
20 VDU28,20,16,20,5
30 PRINT "Acorn User"
40 VDU26
```

Notice that the left-hand and right-hand coordinate of the windows are the same value. Try leaving off the VDU26 (restore default window) to see why line 40 is necessary.

## QUICKFIRE QUESTIONS

Darren White from Chelmsford would like to know how to disable any ROMs in his machine. First find out the ROM number (see Hints & Tips February '86) and then add this to the number &2A1. So, if the ROM in socket three is to be disabled, type ?&2A4=0. When this has been done, pressing Break will reset it, so if a disc auto-boot program is to be loaded, type either: *EXEC !BOOT or *RUN !BOOT. Depending on the type of !BOOT file, this is exactly the same as using Shift-Break, except that the computer is not reset first. If it's possible to catalogue the disc, at the top right it will tell you whether to *EXEC (option 3) or *RUN (option 2) the disc.

Mr Grimason from Portadown would like to know if his *Wordwise Plus* is faulty because it will not display more than two or three pages in the 80 column preview mode. This is quite normal: *Wordwise Plus* reverts to 40 column preview mode if there is not enough memory space left to go into 80 column mode.

Mrs Chesterfield from Bristol wants to know how to calculate how many data files can be stored in memory and on disc.

First the number of bytes in each record needs to be calculated.

To do this add one to the number of bytes allocated to each field in the record and then add these lengths together.

To find out how much memory is available in the computer to store a complete record, you will first need to run your database program so that it sets all its own workspace. Then leave from the program by pressing the Escape key and enter:

```
DIM P% -1
PRINT HIMEM-P%
```

The figure printed will be the amount of 'free' memory remaining. All you need do is divide the number of bytes required for each full record into this to give you the total number of records.

On disc the maximum storage space (assuming a newly formatted blank disc) is:

(number of sectors-2)*256

On a 40 track disc this gives 97,280 bytes and on an 80 track disc 199,680 bytes. Again, dividing the record length into this will give the maximum number of records.

If you need to have other programs coresident on the disc you'll have to subtract the file length of each from the bytes free value before dividing this by the record length.

# FIRST BYTE

## TRANSFERRING YOUR AFFECTIONS

**First Byte offers advice on the best way to transfer your programs from tape to disc**

***Tessie Revivis***

In the early days with my computer, my big ambition was to get the cash together to buy a disc drive. This was about four or five years ago and my first disc drive was a single sided 40 track affair, which (I think) cost about £300! Nowadays such drives can be picked up at a fraction of the cost – less than £50 in most cases, while an 80 track drive can be yours for around only £80 (or about £150 for a Plus 3 for the Electron).

I don't propose to spend this month's First Byte chatting about disc drives but about the problem that confronts all users (other than lucky Master owners!) who upgrade from tape to disc – the subject of transferring your programs and games. If you are looking for information on disc drives I would direct you to two articles by Bruce Smith in the July 1985 and February 1986 issues of *Acorn User*.

When confronted with a problem of this type it's a good idea to break it down first into the steps you need to achieve, and then develop these into a program. The steps required for the tape to disc program are: 1) select tape filing system; 2) load program; 3) select disc filing system; and 4) save program to disc.

### Overwriting software

The first problem you come across is that if you write a program to do the above, loading a subsequent program from tape will overwrite your transfer software! You can get around this, though, by using a function key to hold the instructions. For example, if we have a tape file called GRAPHICS, the program steps that would be required are:

```
*TAPE
LOAD "GRAPHICS"
*DISC
SAVE "GRAPHIC"
```

We've had to shorten GRAPHICS to GRAPHIC because disc filing systems will allow only seven characters in a filename. The key definition therefore becomes:

```
*KEY0 *TAPE|MLOAD"GRAPHICS"|M*DISC|MSAVE "GRAPHIC"|M
```

Pressing function key f0 at any time will therefore effect the transfer.

The above method works happily with straightforward Basic programs, but it won't work with machine code programs or data files or text files from a wordprocessor, for example. These can be transferred but you have to use the operating system equivalents of LOAD and SAVE; that is, *LOAD and *SAVE. Both of these star commands need information other than just the filename – they need to know the start and end addresses of the file in memory. To find this out, first catalogue the program with the tape system's extended catalogue information facility enabled. To do this type *OPT 1,2 after which the file can be catalogued. If our example file GRAPHICS was a data or machine code file on tape, the procedure would be:

```
*OPT 1,2
*CAT GRAPHICS
```

When the last block in the program has been reached the extended information will be displayed – it might look like this:

```
GRAPHICS 01 0200 00002000 00002000
```

The information presented here, in order, is:

| | | |
|---|---|---|
| GRAPHICS | — | the filename |
| 01 | — | the block number |
| 0200 | — | the file length |
| 00002000 | — | the *LOAD address |
| 00002000 | — | the execution address |

The filename is obvious. The block number tells you the number of blocks used to save the program, a block being 256 bytes long (if you listen to a computer tape it's the noisy bit!).

### Hex values

The file length is a hexadecimal value and leading zeros can be ignored, so the length of this file is &200 bytes. This value, combined with the file load address (&2000) is what is needed to transfer a simple data or text file from tape to disc.

To transfer this file we need to first *LOAD the file ignoring leading zeros to the specified load address – &2000 in this case – and then *SAVE the file by specifying the start address (as given above) and the end address. To calculate the end address we simply add the file length to the start address:

&2000 + &200 = &2200

The format of the *LOAD and *SAVE commands is:

```
*LOAD "Name" LLLL
*SAVE "Name" LLLL EEEE
```

where LLLL is the hexadecimal load address and SSSS the end address, also in hex.

Using the format described above, the transfer sequence becomes:

```
*TAPE
*LOAD "GRAPHICS" 2000
*DISC
*SAVE "GRAPHIC" 2000 2200
```

As before, this can be put into a function key if so desired.

Machine code programs can be loaded in from tape in exactly the same way, but before they can be saved we have to know their run or execution address, which is the last value specified in the extended information. In the above instance it was &2000, the same as the load address, but this may not always be the case. The specification for a *SAVE of a machine code program is:

```
*SAVE "Name" LLLL EEEE RRRR
```

where RRRR is the run address. If GRAPHICS was a machine code program the 'save' line would need to be amended to:

```
*SAVE GRAPHIC 2000 2200 2000
```

The above 'star' method is fine, as long as the load address for the program is not less than &1900 (&1D00 for the Advanced Disc Filing System [ADFS]). If it is lower, problems can occur when trying to transfer it because the value of PAGE is at least &1900 when a disc filing system (DFS) or ADFS is installed. On a tape-based system PAGE is set to &E00. The DFS therefore claims at least 2.75k of memory in which it can perform its functions. Loading a program into this area of disc workspace can result in the corruption of the program before you save it. In the case of ADFS you will

probably not even be able to save the program in any form at all as it will corrupt the disc catalogue which the ADFS stores in this area of memory.

## Saving the data

In cases such as these you can load the data or machine code into a 'foreign' area of memory and then save it as though it was saved from its expected address.

As an example, suppose a tape-based program called DUMP gave the following extended catalogue message:

DUMP 03 0300 00000F05

Here we have a file &300 bytes long, with a load address of &F00 and an execution address of &F05.

To load this file at a new address, proceed as usual but use a new load address (&2000 for example) thus:

*TAPE

*LOAD DUMP 2000

The *SAVE command can have a fourth and final parameter added to it – the relocation address – and it's this which is used to fool the DFS into adding the correct loading address to it. The format of the command in full is:

*SAVE "Name" SSSS EEEE RRRR AAAA

where AAAA is the actual load address. To complete the transfer the following two lines are required:

*DISC

*SAVE "DUMP" 2000 2300 0F05 0F00

The above raises the question of how we get the program to load and run below the DFS value of PAGE: more on this in a moment.

The approach detailed so far for loading and saving programs, data and machine code files is effective, but if there are a large number of files to be transferred, tedious. Listing 1 on the yellow pages is an automatic program which will do the lot for you – all you need do is run the program, making sure that the tape containing the programs to be transferred is in the cassette recorder and a blank formatted disc is in drive 0. The program is intelligent and copies all types of files.

Once you have your programs on disc you can, in most instances, simply load them in and use them as normal. There are times though, when perhaps because of the program's size, it will only run as though it is a tape-based program with PAGE set to &E00.

Such programs can still be used but you need to employ a routine to relocate the program. In simple terms you need to load the program in from disc; select the tape filing system; move the program down to &E00; and then run it.

Basically what's required is a short routine which takes the bytes of memory from PAGE to TOP (the top of your program) and puts (or pokes) them into memory starting at &E00, and ends by resetting PAGE to &E00 and running the program. Listing 2 on the yellow pages can be added to the end of your program to perform the task.

After you've loaded your program in from disc, type:

GOTO 10000

and the program will be relocated and run.

Machine code programs can be treated in exactly the same way, but PAGE and TOP should be replaced by the load and end address of the file, and the RUN by a CALL to the execution address, ie, CALL &F05 in the case of the DUMP program described earlier.

## Protected files

All that I've described so far will work happily provided the software you are tyring to transfer is not protected in any way. Protection is, in many cases, ingenious programming by the software writer that will not allow you to make extra copies of the program. If you can't catalogue the program or get it to produce extended messages, the program is almost certainly protected.

Programs of this type can still be transferred but need transfer routines which are too sophisticated to be described here or, due to their length, listed in *Acorn User*. However, there are many ROMs available that will transfer programs from tape to disc for you.

Watford Electronics, for example, sell *Transferom*. This will cope with most (though not all) protected programs including very long adventure programs. It is menu driven which means that it provides you with options which you select by pressing a particular key. *Transferom* is for the BBC micro.

Slogger Software markets *T2P3* (a Tape to Plus 3 transfer ROM) for the Electron which is easy to use, though you'll need a ROM expansion box into which to insert the ROM.

*Replay* is the current state-of-the-art answer to tape to disc transfer, available for the BBC B. This consists of a ROM and some hardware which must be attached inside the computer. Once installed it will cope with virtually any program you care to put to the test.

To sum up, transferring your own programs from tape to disc is straightforward and listing 1 will cope well. Commercial software is generally protected to prevent copying and in such instances you'll need a ROM to perform the task for you.

## How to enter and use the program

The T2D (Tape 2 Disc) program is written entirely in Basic and should present you with no real problems when entering it. When it is complete you should save it to disc using the filename 'T2D'.

To test the program take a blank tape and save about half a dozen programs onto it, one after the other (you could use the T2D program and save it six times using a different filename each time). When you have done this put a blank formatted disc into drive 0 – in fact you can use a disc containing files as long as there is enough room to take the files from the tape. Load and run the T2D program, and follow the instructions presented on the screen. After you press any key the first program will load from tape. The tape will then stop and the program will be saved to disc. This process will repeat until all files on the tape have been loaded in and saved to disc.

The program cannot tell when all the files have been transferred. Once you are sure that they have been, or the tape has wound through to its end, press the Escape key. Type *DISC followed by *CAT. You should see the six files in place and these can now be loaded in and used in the normal way.

The program relies on the cassette recorder having a motor control on it so it can be turned on and off while programs are being transferred. If your cassette player does not have this facility, you'll need to do one of two things. First, to stop the tape after each program has been loaded in, or second, to leave a few seconds gap on the tape between each file as you save it. In practice, however, you will probably not need to do either as the transfer will be so quick the tape will not have reached the next program when T2D comes to load it in.

If you have a double sided or dual drives you can adapt the program to save on to whichever disc surface you want, simply by adding an extra line:

315 *DRIVE 2

Insert the drive number to suit yourself. The above would save the file on drive 2.

### PRODUCT DETAILS

**Transferom** – £25.30
Watford Electronics, Jessa House, 250 Lower High Street, Watford, Herts. Tel: (0923) 37774.

**T2P3** – £19.95
Slogger Software, 215 Beacon Road, Chatham, Kent. Tel: (0634) 52303

**Replay** – £35.00
Vine Micros, Marshborough, Sandwich, Kent. Tel: (0304) 812276

*See yellow page 105 for Tessie Revivis'* T2D *program listing*

# LETTERS

Write to Letters, Acorn User, 141-143 Drury Lane, London WC2B 5TF

## MASTERING THE ELECTRON

Sir, Congratulations to Acorn on the latest computer, the BBC Master – it's now by far the best on the market. I especially like the ROM facilities, pinched from the Electron's Plus 1 unit.

I'm an Electron owner and although I like the Master very much I will probably stick with my machine for a while.

Which brings me to the point of this letter. It is my experience (humble though it may be) that tape and disc drives are a pain in the backside and that permanent memory RAM units are the solution to the problem.

If the boys at Acorn could upgrade the Electron's Plus 3 unit, replacing the discs with a solid state permanent memory filing system and include with it a numeric key pad, it would please me no end.

**G C Warren**
Surrey

## LEGAL AND DECENT?

Sir, I have recently come across a situation that is probably very familiar to those readers of *Acorn User* who have tried to obtain equipment from mail order companies, but I have seen little comment on this subject in the correspondence columns of any of the popular home computer magazines. I refer to the highly misleading advertisements that regularly appear from many large and famous companies offering equipment that they do not carry in stock, have not had in stock for some time, and whose true prices bear little or no relation to the figures quoted in the published advertisements.

A recent attempt to buy disc drives gave plenty of examples of this dubious practice. A well-known company received my order, but I heard nothing for two months, in spite of writing again. Eventually, I phoned them, only to hear they had not had the item in stock for the whole period in question and wouldn't be getting them for another month. Meanwhile adverts, with steadily rising but entirely fictitious prices, regularly appeared in the press. The likely price applicable when they would have stock to send out would be some £50 more than that published when I had originally ordered.

I then telephoned every company in the February issue of *Acorn User* claiming to sell this particular item. Most did not have the disc drive, and those which did were selling at prices substantially above those advertised.

This occurred so consistently that it was hard not to believe that the microcomputer business has adopted the practice of placing ads of goods they know they cannot provide, at prices they have no intention of honouring.

Another example was Gemini's *Datagem*, offered by two companies at big discounts. One company has advertised this price regularly, in spite of having no stocks of the item. The other 'sold out' of the reduced price stock while the ad was still current.

I think we can all accept price rises, selling out of stock and similar events. However, the habit of advertising 'fantasy' goods at 'fantasy' prices seems more a cynical manipulation of the customer. Presumably the companies benefit, though I rapidly saw the advantages of going to a High Street dealer. Does the home computer trade really need to work like this?

**Dr G P Harper**
Essex

**There have been a spate of complaints about disc drives, and the Advertising Standards Authority investigated Akhter, Microman, Tiger, Twillstar, Viglen and Watford. In each case the company was judged to have been caught by an unexpected price rise and, because it had acted in good faith, the complaints were not persued. Vigilance is vital and the motto is to check before ordering.**

## ART INTO SUPER ART

Sir, May I point out a small inaccuracy in Jonathan Inglis' review of the AMX *Super Art* package in the March edition of *Acorn User*. He expressed disappointment in being unable to load pictures previously created with the old *Art* programs.

It is perfectly possible to load old screens into *Super Art* – you simply have to select option LOAD B&W (black and white) from the Goodies menu and then supply a filename.

The picture can then be saved in *Super Art* format by selecting option CREATE from the file menu. The picture in figure 1, for example, is one of several that I have successfully transferred.

Keep up the good work (*Acorn User* and *AMS*!).

**Chris Parker**
Peterborough

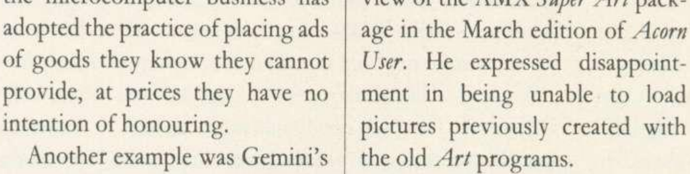



**Figure 1. A car successfully driven from *Art* into *Super Art***

## FLIGHT KNOWLEDGE

Sir, I am extremely interested in flight simulation programs. I have all the programs available that I have knowledge of, but I'm sure there are more.

I am looking for someone to help in designing a definitive flight simulation program. Through my knowledge of real flying, general interest in aviation and seeing the good and bad parts of the many flight programs that are around at the moment, I feel that I am in the position to be able to offer the basis for a very realistic package indeed.

I have no knowledge of programming the BBC B but of course I have basic knowledge of the machine's operation.

I would be very pleased to hear from any individuals, companies or software houses who have a flight simulation program which is not generally available or from any party interested in my idea. I really would like to get this 'off the ground'!

**Alex J M Ford**
Western Engineering,
27 Colne Avenue, West Drayton,
Middlesex UB7 7AJ

## ALONE IN OZ

Sir, A lonesome BBC owner would like someone in Australia, preferably in Sydney, to write to, to swap games, ideas, etc.

Also anyone in a user group in Sydney who would like another person to join could ring me or write a letter.

I will send a reply to every letter as quickly as I can. Please write to me at 9 Cudal Place, Carlingford, Sydney 2118, Australia. Tel: 8722534.

**Matthew Weir**
Sydney, Australia

# LETTERS

## 128k B+ SHADOW

Sir, When February's issue of *Acorn User* arrived I was very interested to read Joe Telford's article on shadow RAM, having bought a 128k BBC B+ with *View 3* three weeks earlier.

On the other hand I was somewhat amazed to see the news about the new Master series of machines. I think Acorn has a cheek to run two page adverts for the 128k B+ one month and then announce its successor the next!

I am very pleased with my new machine but would have hung on and saved myself the cost of *View* if I had known about the Master – or for only a tenner or so more I could have had an on-board second processor.

Anyway, could you please ask Mr Telford if he would write about uses for the 12k of sideways RAM above the screen RAM on the B+ – is there any way to use it as a printer buffer, for instance?

Meanwhile, I console myself with the thought that the 128k B+ is probably more software-compatible than the Master series; at least one can still transparently load soft-key definitions, etc, in the usual way.

PS: Has Acorn been taking lessons from Amstrad?

**Paul F Tolson**
West Yorkshire

## WHY NO SUPPORT FOR THE 6502?

Sir, I am writing to explain my frustration at Acorn's range of product. At great expense (since I was still at school) I bought a BBC B three years ago. Unlike many others, I am a serious programmer and was disgusted by the Beeb's low memory capacity. The 6502 second processor was therefore the next logical purchase. The support for this product from Acorn was, and still is, abysmal. Also, unlike decent machines, no monitor or drives were included with the BBC B.

Thank goodness I didn't upgrade to a B+ – an obvious stopgap to keep Acorn afloat. And now the new Master Range. Congratulations Acorn – it looks like a winner! It also looks as though a death warrant has been signed for the model B.

From constant use, my second processor now refuses to work, and I have the equivalent of an elephant on my desk (my Beeb and its peripherals).

Like many other Beeb owners I feel cheated and disgusted at the lack of support for the 6502 second processor. I am now studying for a Computer Studies degree, with the aim of becoming a systems analyst. So goodbye Acorn – my next machine will not be a revamped fossil. It will be a genuine 32 bit, drive and monitor inclusive, machine for the 1990s. I have learnt by my mistakes.

**I S Gibson**
Kent

## PRODUCING STRIPS

Sir, Wanting to make a new function key strip for a program I was writing recently, I turned to Computer Concepts' *InterSheet*.

The technique proved to be simplicity itself. Columns A and L of the sheet are set to three characters wide, and columns B to K (10 columns, corresponding to the 10 function keys) are each set to nine characters. The labels needed are then typed into the 10 columns, using centred justification. By using the 105 column display mode, the whole key strip can be seen at one go, and the layout is thus easily checked.

Finally, the print command /P 27,64,27,77; is entered, which sets the printer (Epson or Canon) into elite-sized characters. Columns A to L are then printed, and hey-presto: the key strip is produced.

**David N Waters**
Bucks



**This lady was produced by Graham Owen – can you help him create better?**

## HELP ON GRAPHICS

Sir, I am a research student at Manchester Polytechnic, my interest being in computer graphics.

Could I through your letters page ask for a little assistance? I would like to hear from any reader who's into computer drawing of any kind. I am interested in any drawing programs or pictures for any purpose whether purely artistic, graphic or technical.

The work could have been carried out on a commercial package and be black and white or colour, then dumped to plotter or printer. I would also be interested in software designed by individuals, or any recommendations readers might make about any particularly useful programs or utilities.

To finish on a high note: I very much like the new magazine design and layout, and the high standard of editorial content. It appeals to a wide readership, and also to the continuing newcomers to computing (no, I'm not crawling!).

**Graham Owen**
M A Studies, Department of Communication Arts and Design, Grosvenor Building, Cavendish Street, Manchester M15 6BR

**Two addresses which may be of help are those of SIGGRAPH UK, 129 Ardmore Lane, Buckhurst Hill, Essex IG9 5SB and ACADE, c/o Hugh Anderson, Faculty of Art & Design, Middlesex Polytechnic, Cat Hill, Barnet, Herts EN4 8HT.**

## INVALUABLE SOFTWARE

Sir, There are many useful engineering software and hardware developments taking place in such subjects as structures, electronics and graphics in places like Harwell, Sussex University, Nottingham, Kings College, etc, which to the serious user could be invaluable.

As a regular *Acorn User* reader, I have not come across a survey of available software in this category. Also, the modem/mainframe accessibility to these programs could be a boon in the future. Can *Acorn User* advise where a comprehensive list of available programs can be found?

**T Williams**
Sussex

**We do not know of such a list, but would like any readers who are aware of such to send us in one, or let us know where it can be found.**

**The news pages do try to cover software of this kind, and we actively encourage people to pass information through our free ad and £10 ad pages – not to mention setting up a user group.**

# PEARTREE

BRITISH BROADCASTING CORPORATION
MASTER SERIES MICROCOMPUTER

BRITISH BROADCASTING CORPORATION
MASTER SERIES MICROCOMPUTER

BRITISH BROADCASTING CORPORATION
MASTER SERIES MICROCOMPUTER

# THE NEW MASTER IN STOCK NOW

## COMPUTERS

| | |
|---|---|
| BBC Mod B Plus – 64K | £399.00 |
| BBC Mod Plus with Econet | £410.00 |
| BBC Mod B Plus with DFS and Econet | £465.00 |
| BBC Mod B Plus – 64K with upgrade kit | £449.00 |
| BBC Mod B Plus – 128K | £449.00 |
| BBC Master | £499.00 |

## DISC DRIVES

Pear Tree's own Mitsubishi d/s 800K disc drive in black box **£219.95**

## MODEMS

**NIGHTINGALE MODEM**
**Special Offer** £130.00
Price includes Commstar ROM and comprehensive manual

| | |
|---|---|
| Auto Dial/Auto Answer Board | £55.00 |
| Auto Dial Utilities Disc | £11.00 |
| OBBS Bulletin Software | £23.00 |

MINOR MIRACLE WS2000
BT approved Optional Computer Control Auto Dial Auto Answer Options Available

| | |
|---|---|
| WS2000 | £148.00 |
| Lead (BBC modem) | £7.50 |
| Auto Answer | £34.00 |
| Auto Dial | £34.00 |
| Data Beeb | £28.95 |

Communications ROM includes full Prestel facility and control of WS200 Auto Dial Auto Answer 30 ARDS

DEMON
With its devilishly clever features Auto Dial, Auto Redial, Auto Answer, Full and Half Duplex European and USA Standards, complete with power supply leads and manuals. Full Baud rates.

| | |
|---|---|
| Demon with BBC ROM | £81.00 |
| Dial Disc | £4.95 |

## PRINTERS

DOT MATRIX PRINTERS

| | |
|---|---|
| The new Centronics GLP Printer with 50 CPS and NLQ | £133.00 |
| The new Seikosha Printer with 100 CPS and NLO 1000A | £199.00 |
| Just arrived – Seikosha GP50 Graphics Printer. | |
| Seikosha GP50A (Parallel) | £69.00 |
| Seikosha GP50S (inc Spectrum Printer interface and cables) | £69.00 |
| Kaga KP810 (NLO) | £225.00 |
| Kaga KP910 (NLO) | £379.00 |
| Canon PW 1080A (NLO) | £299.00 |
| Canon PW 1156A (NLO) | £379.00 |
| Star SG10 | £249.00 |
| Star SG15 | £389.00 |
| Epson LX80 | £249.00 |
| Epson FX85 | £399.00 |
| Epson 105 F/T | £525.00 |
| Brother EP 44 | £228.00 |
| Shinwa CP 80A | £169.00 |
| MP 165 | £240.00 |
| Juki 5100 | £269.00 |

## MONITORS

MONOCHROME MONITORS

| | |
|---|---|
| Philips BM 7502 Green Screen | £79.00 |
| Philips BM 7552 Amber Screen | £95.00 |
| Kaga KX 1201G Hi-Res Green | £103.00 |
| Kaga KX 1203A Ultra Hi-Res Amber | £120.00 |

COLOUR MONITORS

| | |
|---|---|
| Microvitec 1431 Std Res | £212.00 |
| Microvitec 1451 Med Res | £275.00 |
| Microvitec 1441 High Res | £420.00 |
| Microvitec 2030 CS20 Std Res | £435.00 |
| Microvitec 1431 AP Std Res | £228.95 |
| Microvitec 1451 AP Med Res | £299.00 |
| Kaga RGB Vision II | £258.00 |
| Kaga RGB Vision II 12 Ultra High Res | £365.00 |

**NEW** Philips CM 8501
Std Res Monitor with grey glass screen, RGB and audio input. Only **£199.00**

**NEW** Philips CM 8533
Med Res Monitor with dark glass etched screen, composite video input, RGB and audio input **£299.00**

TV MONITORS
**NEW** Philips 1114 Colour TV Monitor with 14" tube offering preselect channels. RF CVBS and RGB inputs. **£209.00**

## DISCS

Pear Tree's 96 TPI d/s d/d with plastic box holder
Ten 5¼" discs **£15.50**

ACORN 1770 DFS UPGRADE KIT
Kit comes complete with daughter board, chip set and software. Enables ADFS to be fitted. Includes many new commands e.g. *FORM *ROMS *FREE *MAP etc. **£46.95**

ACORN ADFS UPGRADE
A ROM upgrade allowing unlimited file names and hierarchical directory structure. Treats each drive as one side, increasing capacity to 128 MBytes on dual 80 column d/s drives. **£27.95**

VIEW
Version 2.1 of Acorn's wordprocessor. Allows 80 column editing, printing direct from memory, etc. **£47.95**

VIEW 3.0
A version of View suitable for the BBC+. Comes with a cassette version of the Printer Driver Generator. **£79.95**

HI-VIEW
A disc based version of this popular wordprocessor for the 6502 second processor giving 47k of user memory. **£44.95**

VIEWSHEET
Acorn's spreadsheet ROM giving 255 rows by 255 columns, multiple windows, works in any mode, wide use of function keys, fully compatible with View. **£47.95**

VIEWSTORE
Acorn's new database ROM. Works in any screen mode; many powerful sorting facilities, can be spreadsheet or user defined card layout. Max record size is 60k. Output can be sent to View and Viewsheet. Comes with comprehensive manual, utilities disc, etc. **£54.95**

GRAPHICS ROM
Acorn's new 16k graphics ROM giving many new commands for extensive graphics. Circles, ellipses, arcs, rectangles, parallelograms, segments and sectors etc. are all available. Comes with manual and utility cassette. State B or B+ version. **£27.50**

BASIC EDITOR
Acorn's new editor ROM allowing all the normal wordprocessor facilities to be used on basic programs. Features include block copy, block move and use of labels. **£28.95**

TERMULATOR
A terminal emulation ROM. Emulations provided are VT100, VT52, 4010, teletype, hardcopy and special BBC terminal. Comes with user guide and a set of function key strips. **£31.95**

ISO-PASCAL
A full implementation of the ISO standard supplied on two ROMs with two comprehensive guides. 6502 disc versions also supplied. **£59.95**

LOGO
A full implementation of the Logo language supplied on two ROMs. Comes with manuals, user guide, example disc and reference card. **£59.95**

COMAL
A full implementation of the International Standard for Comal. Comes with comprehensive manual. **£45.00**

## HOW TO ORDER

You may purchase any of the items listed, by cheque made payable to **PEAR TREE COMPUTERS LTD**

All you have to do is to list your requirements on a sheet of paper, post it to us quoting ref. and we will despatch your goods within 24 hours.

Please add the following amounts for postage and packing:

| | |
|---|---|
| Items below **£10.00** | add **£1.50** |
| Items below **£50.00** | add **£2.50** |
| Items below **£100.00** | add **£3.50** |
| Items over **£100.00** | add **£8.00** |

All prices include VAT at 15%.
No hidden extras.

Access Card Holders – call us on our new special line: **(0480) 50595**

**PEAR TREE COMPUTERS LTD,** FALCON HOUSE, HIGH STREET, HUNTINGDON CAMBS. PE18 6SS

# LETTERS

## SPEAK TO ME PLAINLY

Sir, I am a relative newcomer to computing and to *Acorn User* but I don't believe I'm a complete dope! However, on reading some of the March issue I begin to wonder.

Take 'Master Work. Our technical editor takes the lid off the simplest of Acorn's new series of micros'. I'm OK until the paragraph about the Break key – I'd love to be able to turn mine off and I suspect that many other owners would too. In the next sentence I'm floored because I don't know about the 'software key'. Presumably this is *KEY 10 but it's hardly calculated to endear me to your technical editor.

On page 74 I'm invited to read about the memory map and study 'figure 1'. As this is two pages away I need a second copy of the magazine – if the photo on page 74 was swapped with figure 1 the problem would have been solved. Problems with the layout of articles are a regular occurrence in computer publications.

Lastly, can I make a plea for plain English? Each edition contains a wealth of (I presume) useful information but it's written in jargon. I believe most areas of computing can be explained in words of two or less syllables. I enjoy reading *Acorn User* (some of it anyway) so please accept my criticism in the constructive spirit in which it is intended.

**Brian Bowell**
Mid Glamorgan

## UNFAIR CRITICISM

Sir, I was disappointed to see part of a letter of mine which was published in November's issue of *Acorn User* quoted by Beebug/Beebugsoft in an attack on you.

My original letter to *Acorn User* was edited and had the full text been published readers would have seen that my rebuke related to a few specific articles rather than *Acorn User* as a whole.

In fact *Acorn User* is still my favourite even though I subscribe to *Practical Computing*, *Personal Computer World* and *Beebug*. I've subscribed to both *Beebug* and *Acorn User* since their beginnings.

When my truncated letter was published n November 1985, I had intended to write to congratulate *Acorn User* on its content. I regret not having done so as *Beebug* has now published two small quotes from my published letter as its response to some valid criticism appearing in *Acorn user*.

I don't want to take sides but if one compares a typical issue of *Beebug* with *Acorn User*, the difference in size and presentation of content is staggering.

As a member of a 'a totally independent user group' (*Beebug* page 2, issue 1, April 1982) one noticed the gradual dropping of the original aims so admirably expressed in the first issues.

Beebug Publications Ltd, Beebugsoft Ltd and PMH Mailing Services Ltd gradually made their presence known. After a while the turnover must have exceeded £1 million annually if one adds in the income from subscriptions, software, distribution deals with High Street multiples and Computer Concepts, the Electron side of the business, hardware sales, advertising, etc.

As a 'member' I had often wondered why discounts obtained from suppliers were never fully passed on to the other members in the form of lower prices. In fact, *Beebug*'s own hardware prices always seemed to be near or at the maximum recommended price. There are dealers selling the same or very similar items at lower prices and some of them advertise in *Acorn User*.

The members' 25 per cent software discount is smaller than the trade discount at which I can usually purchase some of the excellent *Beebug* products.

Is it too late to revitalise the original aims of the 'Independent National User Group for the BBC Microcomputer' which, incidentally, on its May 1985 cover proclaimed itself to be 'Britain's Largest Computer User Group. Membership exceeds 30,000'?

Finally, may I assure everyone that I am not 'disgruntled readers' but merely one person, despite what *Beebug* printed.

**Paul Janik**
Jersey

## EPSON HELP

Sir, I have just bought an Epson P40 which is good value for money and performs all my needs easily – until I wanted screen dumps in modes 1, 2 and 4. I tried the printer dumps given in your magazine for other Epson printers but to no avail. Can anyone help?

**Andrew Jackson**
Essex

## Latest round-up of games high scores

| | | | |
|---|---|---|---|
| Aviator | Acornsoft | 30,450 | **P Hopgood*** |
| Android Attack | Computer Concepts | 1,495,105 | **Tim Hedger*** |
| Arcadians | Acornsoft | 98,020 | **Niaz Islam*** |
| Battletank | Superior | 108,500 | **Stephen Corcoran*** |
| Castle Quest | Superior | 2,240 | **Peter Simpson*** |
| Chukkie Egg | A&F | 30,275,420 | **Stephen Corcoran*** |
| Crazy Painter | Acornsoft | 279,790 | **Richard Arundale*** |
| Cybertron Mission | Micro Power | 715,960 | **Niaz Islam*** |
| Fortress | Pace | 129,250 | **Stephen Corcoran*** |
| Frak! | Aardvark | 20,000,200 | **Paul O'Malley*** |
| Free Fall | Acornsoft | 5,024 | **Philip Comber*** |
| Hopper | Acornsoft | 52,422 | **John Durrans*** |
| JCB Digger | Acornsoft | 131,450 | **Stephen Corcoran*** |
| Killer Gorilla | Micro Power | 836,475 | **Stephen Corcoran*** |
| Match Day | Ocean | 10-0 | **Matthew Pedeaux** |
| Meteors | Acornsoft | 498,500 | **P Ludgate*** |
| Missile Control | Gemini | 469,225 | **Ian Boffin*** |
| Monsters | Acornsoft | 283,000 | **Stephen Corcoran*** |
| Mr Ee | Micro Power | 944,350 | **Stewart Roberts** |
| Moonraider | Micro Power | 642,125 | **Stephen Corcoran*** |
| Overdrive (BBC) | Superior | 338,450 | **David Perry*** |
| Overdrive (Electron) | Superior | 1,011,720 | **P Ludgate*** |
| Painter | A&F | 203,690 | **Nigel Shaw*** |
| Pengo | Watford | 300,400 | **Stewart Roberts** |
| Planetoids | Acornsoft | 3,186,450 | **Stephen Corcoran*** |
| Pole Position | Atari | 384,250 | **Niaz Islam*** |
| Rocket Raid | Acornsoft | 161,460 | **Roger Austin*** |
| Snapper (BBC) | Acornsoft | 1,839,210 | **Peter Simpson*** |
| Space Adventure | Virgin | 4,890 | **Mark Bradshaw*** |
| Starship Command | Acornsoft | 8,420 | **Ian Boffin*** |
| Zalaga | Aardvark | 23,460,500 | **Ian Boffin*** |

**Scores unbeaten since February 1986*

*Please say whether your score was notched up on a BBC micro or Electron when sending in your games high scores as in future issues we'll be publishing separate tables for each micro.*

# Watford Electronics

**Jessa House, 250 Lower High Street, Watford, England**
**Tel: Watford (0923) 37774/40588 Telex: 8956095 WATFRD**
**Credit Card Orders (ACCESS & VISA) Tel: (0923) 33383 or 50234 (24 Hours)**

All prices exclusive of VAT; subject to change without notice & available on request.

| | |
|---|---|
| BBC B + Micro 64K + DFS | £365 |
| BBC B + Micro 128K + DFS | £389 |
| BBC B + 64K + Econet No DFS | £359 |
| BBC B + 64K + DFS + Econet | £389 |
| 64K Upgrade Kit for B+ | £32 |
| BBC MASTER 128K Micro | £425 |
| BBC MASTER TURBO 4MHz | £520 |
| TURBO Addon | £85 |
| Master E.T. | £335 |
| 1770 DFS Upgrade Kit | £42 |
| ECONET Upgrade Kit for BBC | £42 |
| ECONET UPGRADES Available | |

## This Month's SPECIAL OFFER

*Gemini's popular OFFICE MATE & OFFICE MASTER Software Packages on Disc consisting of: Database, Spreadsheet, Beebplot Graphics, Wordprocessor, Accounts Packs: (Cashbook, Final Accounts, Mailist, Easiledger, Invoice & Statements, Stock Control on.*

**FREE**

*with every BBC B+ & Master purchased from us.*

| | |
|---|---|
| 6502 Acorn 2nd Processor package | £165 |
| Z80 Acorn 2nd Processor package | £319 |
| Acorn IEEE Interface Complete | £280 |
| Acorn Teletext Adaptor | £125 |
| Acorn Prestel Receiver | £115 |
| Acorn Bitstick I | £299 |
| Robocom Bitstick II | £759 |
| Upgrade for B1 to B2 | £450 |
| Bitstick Multiplotter Driver | £65 |

(Securicor carriage £7)

## Dust Cover for BBC Micro £3.50

## EPSON LX-80 PRINTER

Low cost, High performance printer. Print speed 100 cps, NLQ mode 22 cps. Full FX80 compatible. Friction feed supplied as standard. Tractor Feed & Auto Single Sheet Feeder, optional extras.

Price: **£189** (carr £6)
Tractor Feed Attachment **£20**
Single Sheet Feeder **£49**

## VARIOUS PRINTERS

- EPSON GX80 **£187**
- EPSON RX100 **£342**
- EPSON FX80 Printer **£259**
- EPSON FX85 Printer **£315**
- EPSON FX105 Printer **£435**
- EPSON JX-80 Colour Printer **£435**
- EPSON Hi-80 Printer Plotter **£319**
- EPSON Paper Roll Holder **£17**
- FX80 tractor attachment **£37**
- SEIKOSHA GP50A & GP50S **£69**
- Centronics Printer Cable to interface all the above Printers to BBC **£6**

(Securicor carriage charge on printers £7)

## RX & FX PRINTER INTERFACES

Epson interfaces fit inside the printer to allow connection using techniques other than Centronics.

RS232 **£25** RS232 + 2K Buffer **£55**
IEEE 488 **£62**

**Official ACORN Distributor**

## CENTRONICS GLP & Brother M1009 (NLQ) Printers

**A major price break-through in NLQ Printers from Watford**

At last, a full feature Epson compatible NLQ printer at a price that everyone can afford. Due to Watford's bulk purchasing power and low margins we can now offer this incredible printer deal direct from the manufacturers to our customers.

The Centronics GLP printer which is manufactured by BROTHER (and also marketed by them under their own brand name M1009), features a Near Letter Quality (NLQ) mode using a 23 by 18 dot matrix for each NLQ character (this is the same as is used by the very popular Kaga Taxan printers). The NLQ Font Rom supplied is Watford's own Professional NLQ ROM for the GLP.

Single, double and quadruple density graphics modes as well as four character widths and super/sub script printing are also supported, along with many other facilities normally found on printers costing twice as much.

Although the GLP is a very compact printer, it can handle paper up to 10 inches wide. Friction feed is supplied as standard with a low cost tractor feed available as an optional extra.

GLP is bidirectional logic seeking. Has a 9 needle print head. Now available in Serial, Parallel or QL compatible. Please specify.

*Special Offer* ***£105*** *(carr £5)*
Tractor Feed Attachment **£9**

## BROTHER HR-15

Brother HR15 is a high-quality daisy-wheel ideal for a budget printer for serious use. Notable features of this printer include a 3k buffer, 18cps (max), bi-directional proportional spacing, Centronics interface standard, (RS232 optional), optional Sheet Feeder and Keyboard.

ONLY **£285** (carr. £7)

| | |
|---|---|
| Single Sheet Feeder | £185 |
| Electronic KEYBOARD | £135 |
| TRACTOR FEED Attachment | £84 |

**Ribbon Cartridges:**
Fabric **£3**; Carbon **£3**; Multistrike **£5**
DAISYWHEELS (various typefaces) **£18**

## BROTHER HR10

Enhancing the Japanese reputation for quality at a reasonable price, Watford are pleased to offer the new Brother HR10 Daisywheel printer at a new low price that is within the pocket of most Hobbyists and small businesses.

Featuring a 12cps printing speed with a large choice of Daisy wheels on a 10 inch carriage, the HR10 has both Serial & Parallel interfaces as standard, as well ad Diablo 630 compatibility. Other features include: 2K Buffer, Bidirectional printing, friction feed standard & tractor feed optional extra.

Only **£199** (carr £7)

## PRINTER SHARERS
**(Ideal for School environment)**

| | |
|---|---|
| Connect 3 BBC Micros to 1 Printer | £65 |
| Connect 6 BBC Micros to 1 Printer | £129 |

(Cables extra)

## KAGA KP810 NLQ PRINTER

This rugged printer is made by Canon of Japan and is the same as Canon PW1080. It is fully Epson FX80 compatible and offers superb NLQ printing.

Our Price: ONLY ***£179*** (£7 carr.)

| | |
|---|---|
| Kaga RS232 Interface | £49 |
| Kaga RS232 Interface + 2K Buffer | £69 |
| Kaga RS232 Interface + 16K Buffer | £95 |

## KAGA KP910 Printer

Similar to the KP810 but has 17" wide carriage for wide print. Gives 156 columns of normal print or 256 columns in condensed mode. Ideal for printing out spreadsheets.

ONLY **£339** (£7 carr.)

## PRINTER LEAD

Centronics lead to connect BBC micro to EPSON, KAGA, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA etc. printers.

| | |
|---|---|
| Standard length (4 feet long) | £6 |
| Extra long (6 feet long) | £8 |
| RS232 Cable | P.O.A. |
| IBM Parallel 1 meter Cable | £12 |

## PRINTER RIBBONS & VARIOUS DUST COVERS

| Type | Ribbons | Dust Covers |
|---|---|---|
| BBC Micro | £3.50 | |
| FX100 | £10.00 | £5.25 |
| FX80/MX80 | £4.50 | £4.95 |
| RX80 | £4.50 | £4.50 |
| LX80 | £4.00 | £4.50 |
| GP80/GP100 | £4.50 | £4.00 |
| GP250 | £5.95 | £3.95 |
| Centronics GLP | £4.00 | £3.75 |
| KAGA KP810 | £5.25 | £4.75 |
| CANON PW1080 | £5.25 | £4.75 |
| Microvitec Metal Monitors | – | £5.50 |

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

## Listing Paper (Perforated)

| | |
|---|---|
| 1,000 Sheets $9\frac{1}{2}$" × 11" Fanfold Paper | £7 |
| 2,000 Sheets $9\frac{1}{2}$" × 11" Fanfold Paper | £12 |
| 1,000 Sheets 15" × 11" Fanfold Paper | £9 |
| Teleprinter Roll (Econo paper) | £4 |

Carriage on 1,000 Sheets £1.50

## PRINTER LABELS
**(On continuous fanfold backing sheet)**

| | |
|---|---|
| 1,000 90×36mm (Single Row) | £5.00 |
| 1,000 90×36mm (Twin Row) | £4.90 |
| 1,000 90×49mm (Twin Row) | £7.50 |
| 1,000 102×36mm (Twin Row) | £6.25 |

Carriage on 1,000 Labels £1.00




We stock a range of monitors to suit all needs. Choice of a monitor is a matter of personal taste so we recommend that whenever possible, you ask for a demonstration at our shop. All Monitors are supplied complete with connecting lead.

**MICROVITEC 14"**

- 1431 – Medium resolution as used on the BBC television computer programme ...... **£176**
- 1451 – High resolution, suitable for word processing in mode 0 .......................... **£225**
- 1441 – High res, exceeds the capabilities of the BBC micro ........................................ **£365**
- 1431AP RGB + PAL and AUDIO ........... **£199**
- 1451AP RGB + PAL and AUDIO ........... **£259**
- 2030CS 20" RGB/PAL/Audio ............... **£375**
- 2040CS 20" RGB/PAL/Audio ............... **£655**
- TOUCHTEC Touch Screen Pack ............. **£250**
- Dust Cover for Microvitecs .................... **£5.50**

**KAGA/TAXAN 12"**

- KAGA KX1201G Hi-res Green Monitor ..... **£90**
- KAGA KX1202G Ultra-Hi-Res Green Monitor ........................................... **£105**
- KAGA KX1203A Ultra-Hi-Res Amber Monitor ............................................. **£105**
- KAGA Vision 2, Hi-Res, RGB Colour Monitor ............................................. **£210**
- KAGA Vision 3, Ultra Hi-res, RGB Colour; Text mode switch allows monochrome text display in either Green/Amber or White reverse .............................................. **£330**
- PHILIPS 12" Hi-Res Amber Monitor ......... **£73**

### FIDELITY COLOUR MONITOR

- Medium Resolution, attractively finished, 14" RGB and Composite VIDEO/AUDIO Input. Has a detachable anti-glare screen.

**£169**

### ZENITH

12" high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. (These are the same professional quality, stylishly finished monitors as used in the larger Zenith Micro Systems.)

Green (New Design) Hi-res ........................... **£72**
Amber (New Design) Hi-res .......................... **£82**

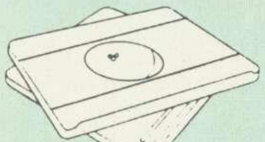
**LEADS**

**BNC Lead for Zenith or Philips** .................... **£3**
RGB lead for KAGA ........................................ **£3**

**N.B.** Carriage on Monitors **£7** (securicor)

## SWIVEL BASES

**for Video Monitors**



Adjust your Monitor/VDU, Up, Down, Right or Left to provide utmost in operator flexibility & Viewing comfort. It improves your sight lines & reduces stress & eye, neck and back strain. Available in 2 sizes:

for 12" Monitors **£14**
for 14" Monitors **£16**
(carr. £2.50)

**CREDIT CARD**
**Orders (ACCESS or VISA)**
**Simply phone**
**(0923) 33383/50234**
**24 Hour Ansaphone Service**

## SPECIAL OFFER

EPROMs for BBC's Sideways ROMs.

**2764-250nS £1.85**
**27128-250nS £2.55**

RAMs (Low power) for ATPL, WATFORD, etc., Sideways ROM Boards

**6264LP (8K) £3.25**
**2 × 6264LP (16K) £6.40**

## BBC MICRO WORD-PROCESSING PACKAGE

A complete word-processing package (which can be heavily modified to your requirements, maintaining the large discount). We supply everything you need to get a BBC micro running as a word-processor. Please call in at our retail shop to discuss your particular requirement and a demonstration.

**EXAMPLE PACKAGE**
BBC B Plus (64K) Micro; Wordwise Wordprocessor, Twin 800K Double Sided Mitsubishi Disc Drives, Zenith Hi-Res Green Monitor, Brother HR15 professional quality Daisy Wheel Printer, Gemini Database, Spreadsheet, Beebplot Graphics, Accounts Pack: (Cashbook, Final Accounts, Mailist, Easiledger, Invoice & Statements and Stock Control) Software packages on Disc with Manuals.

**NEW LOW PRICE**

**Only £999**

## THE EPSON RX/FX/KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX/KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, Canon PW1080A or any Epson FX80 compatible Printer with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

Superb Value at **£5.95** (No VAT)

## MARK LIGHT PEN

You no longer have to fiddle with the brilliance control or work in the shade as this NEW Mark II Light Pen is totally insensitive to local lighting conditions. It only operates on high frequency light from the TV or Monitor.
The red LED Indicator on the Mk II pen, lights up when valid video data is available. Your program can have access to this signal allowing computer verification of target for high res drawing. The conveniently located switch on the pen body allows the computer to ignore any stray signals. Supplied complete with the sophisticated PEN-PAL Software on Cassette or Disc. Please specify.

Mark II Light Pen **£25**

**Watford Electronics' Overseas Dealers:**

**Absolute Electronics, 483 Centre Road, Bentleigh, Victoria, Australia 3204.**
**Tel: (03) 557 3971**

**First Ludonics International, 2400 AJ Alphen aan den Ri jn, Nedherlands.**
**Tel: 01720 72580.**

**Scientex PVBA, Willem Ogierplaats 2 B-2000 Antwerpen Belgium.**
**Tel: (03) 233 59 06**

**Technomatic, Hesselager 13, 2605 Brondby, Denmark.**

**Viking Tenco, Kirkegade 4C, Tvaerflojen DK9550 Mariager, Denmark.**
**Tel: (08) 5421 11**

## SPECIAL BULK OFFER ON 5¼" DISCS

**(Lifetime warranty on Discs)**

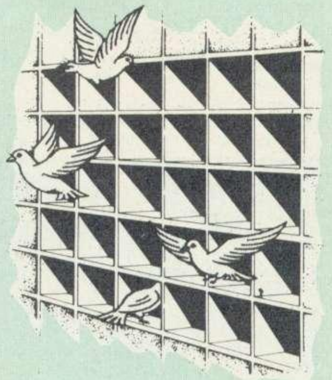
(In Plastic Library Cases)

| | |
|---|---|
| 20 × Single/Side Double/Density 48TPI | **£17** |
| 20 × Double/Side Double/Density 48TPI | **£21** |
| 20 × Double/Side Double/Density 96 TPI | **£29** |

(In Lockable Storage Units)

| | |
|---|---|
| 50 × Single/Side Double/Density 48TPI | **£42** |
| 50 × Double/Side Double/Density 48TPI | **£56** |
| 50 × Double/Side Double/Density 96TPI | **£70** |

## DATABASE MANAGEMENT SYSTEMS



### DISCDATA

Discdata is an entirely disc based database handling system. It is extremely easy to use through its comprehensive menu system. The simplicity is such that we do not feel the need to provide explanation on use in the written guidance supplied with the program. The first-time database user will rapidly become familiar with this package designed throughout to be simple and obvious.

On disc at **Only £14**

(Please specify 40 or 80 track when ordering)
(Please write in for technical specifications)

### FILE-PLUS

File-Plus is a powerful database for the BBC micro with many advanced features. Largely menu driven, File-Plus is provided on a 16k ROM with some extra utilities on disc. Features included are detailed below:

- Flexible full screen form layout.
- Built in File Query Language (FQL).
- Printer Output.
- Arithmetic operations in FQL.
- Looping in FQL.
- Number range of +– 9999999999.9999.
- File linking allows files over different drives.
- Multiple forms allow selection of displayed data.

**Only £25**

(Please specify 40T or 80T disc

**Continued →**

# The ULTIMATE DFSs for the BBC MICRO

## WATFORD TOPS THE DFS CHART

*Watford's Ultimate DFS has scored highest points in ACORN USER's unbiased DFS's Review of July 1985.*
*In concluding, the reviewer writes "It must be said that Watford's DFS certainly offers a comprehensive range of facilities at a very attractive price". (Please write in for comprehensive details.)*

*Just compare the features:*

| Features | Acorn 1.20 | Watford Single Density | Watford Double Density |
|---|---|---|---|
| Max nos. of files per disc side | 31 | 62 | 62 |
| Max disc capacity | 800k | 800k | 1440k |
| Tube compatible | Yes | Yes | Yes |
| Built-in Editor | No | Yes | Yes |
| Built-in Formatter | No | Yes | Yes |
| Built-in Verifier | No | Yes | Yes |
| MRUN a file | No | Yes | Yes |
| MLOAD a file | No | Yes | Yes |
| Extended RENAME | No | Yes | Yes |
| Selective COPY | No | Yes | Yes |
| Default file name | No | Yes | Yes |
| Disc space distribution | No | Yes | Yes |
| 40/80 Software Switchable | No | Yes | Yes |
| Wide catalogue | No | Yes | Yes |
| Close open files | No | Yes | Yes |
| Improved OPENOUT | No | Yes | Yes |
| Copy between densities | N/A | N/A | Yes |
| OSWORD &7F | Yes | Yes | Yes |
| Full entry point compatibility | Yes | Yes | Yes |
| Retain information over a break | 1.20 partial | 1.43 Yes | 1.53 Yes |
| Games compatibility | Yes | Yes | Most |
| Econet file server | Yes | Yes | Yes |
| Econet station | Yes | Yes | Yes |
| Full wildcard facilities | No | Yes | Yes |

## WATFORD's & ACORN's SINGLE DENSITY DFS

*Watford's popular and widely acclaimed DFS has now been available for three years, and has gained a large following amongst serious users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. (P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS).*

**PRICES**

- *Complete Disc Interface Kit incl. DFS ROM & fitting instructions* **£47**
- *Acorn's DFS Kit complete* **£47**
- *DFS Manual (Comprehensive)* *(no VAT)* **£6.95**
  *(P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs)*
- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *DNFS ROM only* **£17** ● *ADFS ROM only* **£25**
- *Watford's DFS is exclusively available from Watford Electronics. Every ROM carries a special label with our LOGO and serial number.*

## WATFORD's DOUBLE DENSITY DFS INTERFACE

*The DDFS from Watford Electronics represents a new standard in DFSs for the BBC micro. This is a double density version of our popular single density DFS, and combines all the features of this powerful DFS with the advantages of a system that gives 80% more storage per disc in double density mode. P.S. – Please note that not all DDFSs are capable of providing either the full 80% storage increase, or of allowing a file the full size of the disc – Ours allows both of these! Operates both in Single & Double Density modes.*

*The typical piece of games software these days is provided upon a protected disc. In order to work on any double density system (including the others on the market) a protected piece of software needs to make calls through the OSWORD &7F routines. To ensure compatibility, the Watford DDFS features probably the most comprehensive and powerful 8271 emulation ever written for a double density system.*

**PRICES**

- *Complete DDFS Kit incl. fitting instructions* **£46**
- *DDFS Manual* *(no VAT)* **£6.95**
- *We will exchange your existing Single Density DFS Kit for our DDFS Unit at* **£35**

# Watford Electronics DDFS PLUS for the BBC B Plus

Watford Electronics was the first company to produce a serious alternative Disc Filing System (DFS) for the standard BBC micro. Since then, we have been refining and advancing this sophisticated product right up to today.

Now WE'VE DONE IT AGAIN; Watford proudly presents the Double Density Disc filing system for the BBC B+, with all the advantages of the advanced Watford DDFS available on the new BBC B+ DDFS.

Acting as a powerful alternative DFS to Acorn's '1770 DFS' supplied with the BBC+, this superb addition to any BBC+ greatly enhances it's performance with a simple fitting operation.

DDFS PLUS incorporates all the features of the Watford's popular DFS & DDFS for the BBC B, (at the same time retaining full compatibility with Acorn DFSs), plus it has the following extra features:

Automatic density selection – Full single and double density operations – Extremely powerful and comprehensive OSWORD &7F emulation – Any file can be full size of disc – Density of last access assumed for speed – Automatic 40/80 stepping swapped on error – All Acorn's extra disc commands implemented.

As you can see from the above information, Watford's DDFS for the BBC+ is far more sophisticated and well thought out than the standard. Take any disc produced by any Watford DFS from the standard BBC and catalogue straight off with no problems.

Unlike the Acorn 'ADFS', our DDFS+ system is just as easy to use as the standard DFSs, with no new complex concepts to have to learn. The features within our DFSs have been constantly enhanced over a period of three years during the time that they have been released; significant attention has been paid to feedback from our customers so that the features offered are carefully honed to the requirements of hobbyists and serious programmers alike.

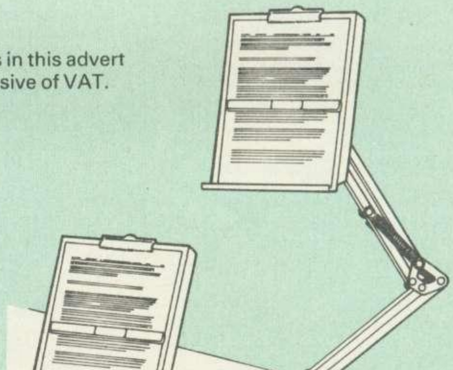
The Watford DDFS+ is supplied with a comprehensive DDFS manual that explains the basics of disc drives, DFSs, etc. Priced at only £30 including the manual, the Watford DDFS+ is surely one of THE best buys you could make for your BBC B+!

Join the leaders in BBC peripherals; join Watford Electronics – committed to supporting the BBC micro.

DDFS PLUS (for BBC Plus) **£30**
(Price includes comprehensive manual)

# COPY HOLDERS

All prices in this advert are exclusive of VAT.



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

Available in desk resting and shelf clamping versions, these two units hold your paper firmly by means of a magnetic ruler and a clip grip.

Mounting to a convenient flat surface, the two joint anglepoise Manuscript Holder allows the paper to be positioned at virtually any convenient angle whilst only taking up a fraction of the surface area that the paper being held does.

The smaller desk resting Manuscript Holder is useful for the more organised desk where the problem is simply holding the paper at the right angle.

Whatever desk arrangement you use, surely you deserve a Watford Manuscript Holder!

Amazing value at only
Desk Top **£10** (carr. £2)
Angle poise **£17** *(carr. £3)*

## Quality Disc Drives from Watford

*To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.*

*The first capacity given in the first column indicates the single density capacity. The double density storage capacity is second one, (that within the brackets). All disc Drive type numbers start with the prefix "C".*

*The tinting on some of the boxes is used to indicate which Drives are 40 track and which are 80 track. The 40 track ones are manufactured by EPSON, the world famous Japanese company, (non-tinted boxes). The 80 track drives are famous MITSUBISHI drives (tinted boxes).*

*With two prices in a box (e.g. £295/£299), the first price is for the standard drive and the second for the same unit in switchable type. Users of either of the two Watford DFSs will not need switchable drives as their DFS will provide software switching for them.*

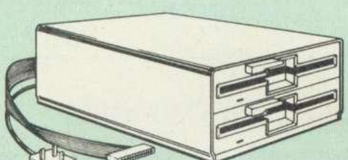
***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the MITSUBISHI and EPSON drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

*Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality Epson and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.*

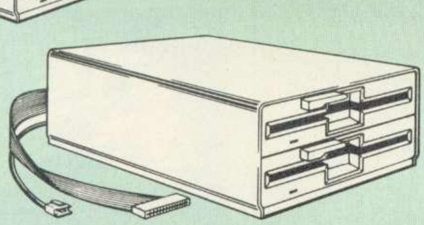
*If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.*

*Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate: extensive tests within our workshops have confirmed this. All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. (Ideal for Schools & Colleges. All single disc drives with power supply, (i.e. CS100, CS200 & CS400S) are supplied in a twin case with twin data cable for later inclusion of a second drive). At Watford we anticipate your needs of tomorrow not just today!*

*When using a BBC Micro, most people find themselves preciously short of space. The Watford's BBC Micro Plinths form an ideal way of recovering some of this space; your BBC, disc drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. Some of our competitors offer disc drives built into plinths, but these aren't as sensible as you might think. With a Watford Plinth, your disc drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen and paper, reference manuals, etc. Follow the trend with Watford Plinth.*



**Drives Subject availability**



| Capacity | Drives without P.S.U. | | Drives with P.S.U. | |
|---|---|---|---|---|
| | Single | Twin | Single | Twin |
| 100K (180K) | CLS 100 £75 | | CS 100 £116 | |
| 200K (360K) | CLS 200 £102 | CLD200 £185 | CS 200 £116 | CD200 £199 |
| 400K (720K) | CLS 400 £104 / £105 CLS400S | CLD 400 £185 | CS400 £123 / £124 CS 400S | CD400 £205 |
| 800K (1.44M) | | CLD800 £194 / £195 CLD 800S | | CD800 £218 / £219 CD 800S |

- TWIN Disc Drive Case, complete with Power Supply & Cables **£35**

Securicor carriage on Disc Drives £6

*Prefix* **C** = *Cased Drive*
**L** = *Less PSU*
**S** = *Single*
**D** = *Double*

*Suffix* **S** = *40/80 Switchable*

*e.g. CLS400S = Cased drive, Less power supply unit, Single 400K, Switchable (40/80 track).*

## MYSTERIES OF DISC DRIVES & DFS REVEALED

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive? What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin? What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford's new book entitled 'MYSTERIES of DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

**£5.95** (Book No VAT)

# 3M – DISKETTES

*Top quality 3M – SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All our discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick disc labels and write protect tabs.*

- *10 × 5¼" S/S D/D 40 Track Diskettes* **£11**
- *10 × 5¼" D/S D/D 40 Track Diskettes* **£13**
- *10 × 5¼" S/S D/D 80 Track Diskettes* **£19**
- *10 × 5¼" D/S D/D 80 Track Diskettes* **£20**

- *10 × 3½" S/S D/D 40/80 track Discs* **£25**
- *10 × 3½" D/D D/D 40/80 track Discs* **£35**

**FREE** Durabeam Pocket Torch with every two boxes of 3M Diskettes purchased from us this month.

## TOP QUALITY 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

**DON'T SETTLE FOR LESS, BUY THE BEST**

- *10 ×* **M4** *S-S D/D 40 Track Discs* **£10**
- *10 ×* **M5** *D/S D/D 40 Track Discs* **£12**
- *10 ×* **M7** *D/S D/D 80 Track Discs* **£17**

- **3"** *Double Sided Discs* **£4** *each*

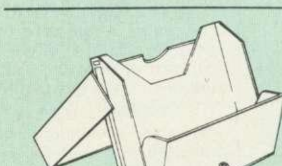
(For special Bulk Offer, see page 2 of our advert)

## LOCKABLE DISC STORAGE UNITS

Strong plastic case that afford real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.



M35 - holds upto 40 discs **£9**
M85 – holds upto 95 discs **£12**



## PLASTIC LIBRARY CASES

FOR 5¼" DISC STORAGE holds 10 Discs. **£1.80**

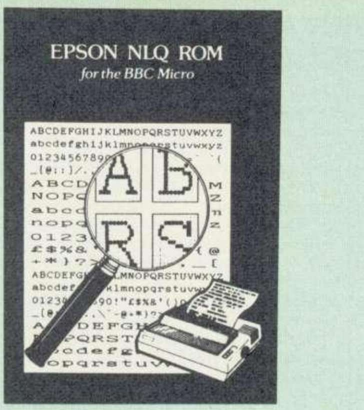
## FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use.

**£8**

## DUST COVERS (For our Disc Drives)

Single (without PSU) **£3.20** Twin (without PSU) **£3.85**
Single (with PSU) **£3.95** Twin (with PSU) **£3.90**




Harness the full potentials of your Epson RX & FX Printers. Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ! (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:

- Simply type *NLQ80/100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80); ENLARGED type; UNDERLINED type. These features can be used seperately or in any combination.
- Full UK character set; Standard 'pica size'; Proportional spacing; Enlarged; Underlined; Normal type.

The NLQ ROM is supplied complete with comprehensive manual.

P.S. NLQ ROM is compatible with the Torch Z80 system and can be used from within the Perfect Writer software.

**Only: £25**

## VIEW PRINTER DRIVER for NLQ ROM

This specially written printer driver has been designed to allow View access to the full features of our NLQ ROM.
A must for all VIEW and NLQ ROM users.

**£7.00**

## THE NLQ DESIGNER

KAGA KP810/910 and Canon PW1080 are two superb printers, as our many thousands of satisfied customers would surely attest to. One of it's particularly strong points is the NLQ option that it offers; perhaps one of the more weaker points is the effort required to design your own custom NLQ font.

Well the solution is here NOW in the shape of Watford's NLQ DESIGNER ROM! For the BBC Micro. This powerful piece of software allows easy design and entry of a full NLQ font, with further fonts recallable from disc. Once a font has been programmed with the versatile NLQ DESIGNER, it can be saved to disc, downloaded to your Kaga (or Canon) printer, or even programmed into an EPROM (given the appropriate hardware) and then plugged directly into your printer so that it is available immediately when you turn it on. Downloadable Fonts require 6264 RAM chip fitted.

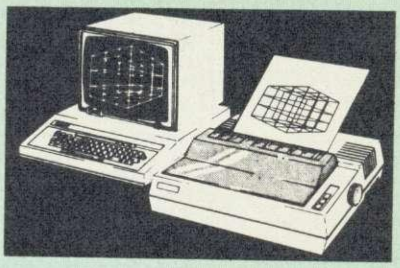
A 40/80 track format disc containing 3 example fonts is included in the package.

(P.S. This ROM is not suitable for Epson printers as they don't normally have NLQ ability. Keep reading our adverts though – work is in development!)

- NLQ Designer ROM & FONT Disc **£25**
- Kaga Individual FONT ROMs **£15**

(Write for further details).

## DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!
The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.
Two commands are used to operate the dump routines:
*GIMAGE – This provides a full graphics dump of any graphics mode, plus modes 7 and '8'. There are many optional parameters but you need only specify the parameters you wish to change.

Features available include:

- Vertical and horizontal scaling through all the graphic modes and mode 7
- Rotation of the image produced through 90, 180 and 270 degrees
- Left hand indentation setting
- Screen dump window definition
- Colour grey scaling
- Two tone fast dump
- Special colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered dumps
- User port switched dumps

What does the independent press say!

*Practical Electronics, May 1985*
"The Dump Out 3 ROM from Watford Electronics represents one of the most sophisticated types of printer dump utilities available for the BBC Micro . . .".

"an extremely sophisticated and powerful dump utility".

"VERDICT – Dump Out 3 ROM has all the facilities which you are ever likely to need for producing printer dumps. The facilities available work extremely well and if printer dumps are something which you require, then this ROM can be recommended to help you to get the best out of your dot matrix printer".

*The Micro User Feb. 1985.*
"Well, here is that winner"!

"provide(s) some rather sophisticated screen dumps. Producing high resolution paper copies of graphic screens in any (graphics) mode will be the major reason for buying this ROM, and this is where Dump Out 3 performs PAR EXCELLENCE". (Our capitals for their italics.)

"The versatility of *GIMAGE (the graphics dump command) when using these parameters is amazing. Pictures of almost any size, shape, contrast or distortion may be produced without the need for a reducing photocopier or trick photography".

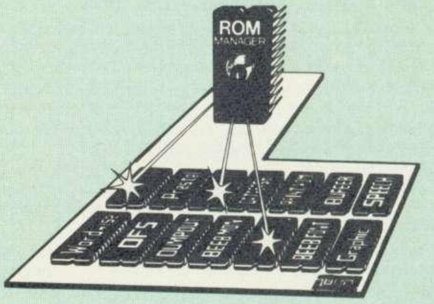
"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC micro. It is easy to use yet highly versatile, and caters for all BBC screen modes in multitone high resolution printing. Whole, partial, rotated and scaled screens may be dumped to almost any BBC compatible dot matrix printer (see our list at the end of this advert). At £25 it must represent excellent value for money and surely cannot be beaten".

Designed for use with the following printers:

CP80, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, LPVII, NEC PC8023, DMP100/200/400, Mannesman Tally etc.
Price including comprehensive manual

**£25**

## ROM MANAGER



Probably the most powerful way of expanding the BBC micro is from the use of Sideways ROMs. One problem faced by the avid ROM collector is that of ROM command clashes. The solution is very simple in the form of the ROM that "Provides comprehensive management of all your installed ROMs". (Quote from BEEBUG November '84.)

Basically, ROM Manager offers you the ability to turn off any installed ROM, or to send any * command to any specific installed ROM. It is said that imitation is the sincerest form of flattery – Acorn's BBC Plus features many of the abilities of this powerful ROM.

Many more facilities available.

**SPECIAL OFFER £18**

## BEEBFONT ROM

BEEBFONT is a remarkable and different concept in BBC software. It allows you to display text on the screen in 13 different styles. It is supplied complete with a Spooler and Editor on 40 or 80 track disc.
(Please write in for technical details).

ONLY **£25**

## BEEB PRINTER ROM



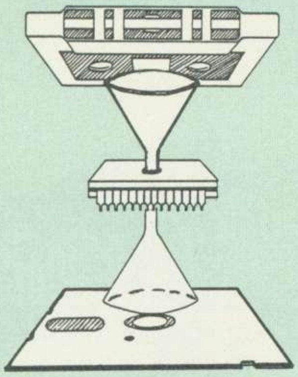
*"Makes Printing Childs Play"*

This utility ROM is designed to simplify using all the facilities of your printer. It has many facilities:
★ Selection of printer modes such as underline, font and size is by 'Single Key' operations.
★ From Wordwise, a single number following OC will select a mode rather than a long and incomprehensible string of control codes. This makes using your printer with Wordwise much more convenient.
★ When using Basic (or other languages) you can have control over the formatting of the output to the printer in the style of a wordprocessor. You can define page top, bottom and side margins etc. with intelligent page skip for binders an option. All supported printers will now respond to form-feed etc. commands.
★ User defined characters are printed as you see them on the screen so that non-standard characters are automatically printed out correctly.
★ Commands select the options for the following printers:
GP100, STAR, NEC, MX/FX, KAGA, LP/VII/DMP100, DMP200.
Operates with either parallel or serial interfaces.
★ Supplied with a 50 page manual that is very comprehensive and easy to follow. Please specify printer type when ordering so that we can send the correct function key strip.

**Price: £25**

## TRANSFEROM

**(Tape to Disc Utility)**



The only TAPE to DISC Utility ROM that works with our Double Density Disc Interface.

This advanced and sophisticated utility ROM for the BBC Micro has the following features:

- Fully menu driven for ease of use
- Copes with locked programs
- A very comprehensive built in copying features
- Copies very long adventure games
- Supplied with comprehensive manual

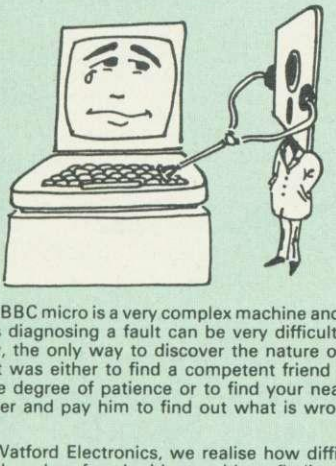
TRANSFEROM is now available in BOTH single and double density versions. The single density version works with both the Acorn and Watford single density DFSs. The double density version works with the Watford DDFS system only.

TRANSFEROM takes your software on tape and saves them onto disc. TRANSFEROM does not stop when one disc is full; you just insert another disc in and carry on with that one! Surely this is the most valuable investment you could make if you have tape software that you wish to transfer to disc! Please specify version required – Single or Double Density.

**£25.00**

**All prices exclusive of VAT**

## DIAGNOSTICS DISC



The BBC micro is a very complex machine and thus diagnosing a fault can be very difficult. Until now, the only way to discover the nature of a fault was either to find a competent friend with a large degree of patience or to find your nearest dealer and pay him to find out what is wrong.

At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

**Continued**

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

**Only £20.00**

## ROMAS

**THE CROSS ASSEMBLER AND MACRO EDITOR FOR SERIOUS PROGRAMMERS!**




ROMAS is a carefully designed, sophisticated yet simple to use, development system for serious assembly language programmers. Using the BBC as the development system, you can choose your target system from the following processors:

6502, 65C02, Z80, 8085, 8041, 6809 and Z8 P.S. This includes the Acorn 6502 & Z80.

ROMAS features a powerful expression analyser, making complex table easy to generate. To aid in documentation, fully formatted assembly listings may be produced, with full symbol table output at the end.

ROMAS is provided with a powerful cross referancer to produce a listing of all the labels in a given "source" program; this makes it easy to check to see if you are about to duplicate a label.

**The Macro Editor**

Features of this powerful editor provided with the ROMAS package include:

- Works in all 40 and 80 column screen modes
- Fast load and save speeds
- Continuous line and column number displays
- Search, replace and move; all available in macros
- Command repetition

The ROMAS package includes a comprehensive manual, providing detailed documentation and plenty of examples.

A give away at . . . **Only £45**

Please specify 40 or 80 track disc when ordering.

## ADE

'Systems' complete program development package in a 16K ROM. We are now supplying the new 6502 2nd processor compatible version.

SPECIAL OFFER ONLY **£34**

## ULTRACALC 2

The mark 2 version of the BBC Publications' extremely popular electronic spreadsheet ROM.

Only: **£66**

## THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSs) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Only **£20**

## ROM-SPELL

"way ahead of any competition"




ROM-SPELL is probably THE most advanced and fastest spelling checker available for the BBC Micro. Printed below are some extracts from a recent independent review (A&B Computing Nov. '85), which we feel sure will convince you that this is THE only spelling checker worth considering.

"The editing system is very neat and simple, instead of replying to queries and beeps all of the time . . ."

"The other feature which places ROM-SPELL way in front of any competition is the ability to examine the user dictionary, so any spelling mistakes that have found themselves on the disc can be examined and taken out if necessary".

". . . that it is compatible with many of the popular word processors on the market is a good indication that ROM-SPELL is going to be a very popular product indeed".

". . . ROM-SPELL is by far the best spelling checker for the unexpanded BBC B (with or without word processor). It boasts features which are hard to find on conventional spellcheckers on CP/M and MSDOS, namely Spellstar and has a speed/performance ratio of roughly the same as its CP/M cousin. The difference is that the CP/M version would cost the best part of £500".

". . . and with such vital house keeping features as an ambiguous word checker, the ability to edit the user dictionary, a comprehensive manual that is both easy to read and actually ENJOYABLE to learn from, . . . I feel confident that ROM-SPELL will woo the word processing public with no problems at all".

Don't settle for less, Buy the best.

ROM-SPELL costs only **£25**

(Please state 40 or 80 track disc)

## REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

**£13** (40 or 80 track)

## BEEBMON

BEEBMON is the most powerful and versatile machine code monitor from Watford Electronics. BEEBMON offers some superb features specially designed to make the task of understanding and debugging machine code easier; indeed BEEBMON is probably the only product with sufficient power to aid in the debugging of such complex pieces of software as a DFS.

Offering a total emulation mode, BEEBMON can be used to single step through code anywhere in memory. All breakpoints are emulated and the workspace is totally relocatable, allowing for the simulation of all those "awkward" pieces of code.

(Write in for technical details.)

**£24**

## DISASSEMBLER ROM

Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use progammers tool.

Please write in for technical details.

ONLY **£16**

**Continued** →

## SIDEWAYS ZIF SOCKET




Now Watford Electronics brings you a ROM board for small budgets or for those of you who do not wish to open up your Micro frequently. It allows you to change ROMs quickly and efficiently with the minimum of effort – no screws to loosen or keyboard to remove. The unit consists mainly of a zero insertion force (ZIF) socket on a small circuit board which is located into the position of the 'ROM Cartridge' and is connected to one of the internal ROM sockets via a ribbon cable.

● Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.

● The low profile of the socket allows unrestricted access to the keyboard, unlike other cartridge systems. In addition, there are no costly extras, such as ROM cartridges for every new ROM.

● All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

● This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)

ONLY **£15** (carr £2)

## 16K Sideways RAM Modules

This is it! The revolutionary design RAM Module you've been waiting for. Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

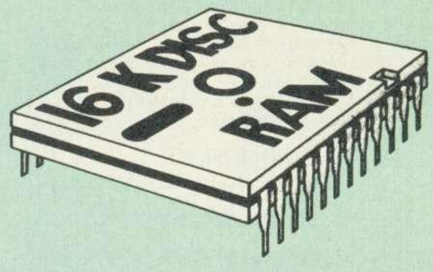
- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Works with any ROM.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

### Optional extras

READ and WRITE protect Switches **£2** each
Battery for Battery Backup **£3**

**All prices exclusive of VAT**



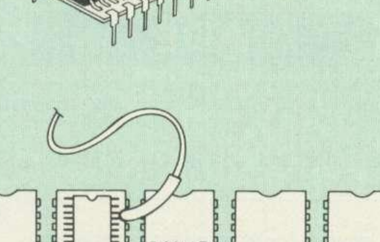

This is the RAM you've been waiting for!! This battery backed up, write protectable 16K sideways RAM board allows you to run from disk every sideways ROM available. Beware of other sideways RAM boards which are not backed up as certain ROMs will not run in these boards even though the RAM can be write protected. The Battery Backup facility allows retention of DATA after power off. On switch on the Micro will think the WATFORD DISC RAM is a ROM. Features available are:

- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- All existing ROMs can be stored on disk and used in DISC RAM.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM in conjunction with our Buffer & Backup ROM.

**New Low Price: £30** (carr £2)

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

## SOLID STATE 16K SIDEWAYS RAM

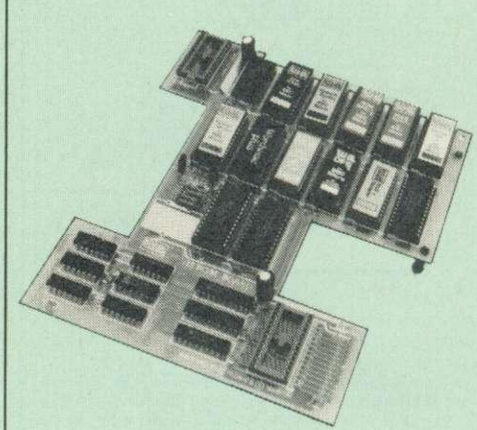





This new unit from Watford, which utilises the latest in Static RAM technology, offers 16k of easy-fit sideways RAM in a very compact unit with a footprint no larger than a standard 28pin EPROM. With only a single flying lead terminating in a mini hook-on probe, to fit, (no soldering required) this compact unit works with any BBC Micro with or without a ROM board. Compatible with BBC B Plus. Like our other 16K RAM Modules, this unit is very simple to fit.

Only **£28** (carr 2)
Supplied complete with comprehensive software on Disc, Operating and fitting instructions.

## SOLDERLESS SIDEWAYS ROM SOCKET BOARD



This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16. Also permissable, are various configurations of RAM (up to 16k) and different sized EPROMs (see below).

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 can take the following chips: 2716, 2732, 2764, 27128, 6116, 6264.
- Auto write protect for RAM chips.
- Read protect to make RAM "Vanish"; allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

**Price: Only £32**
Battery backup fitted **£36**
(carriage £2)

## EXTERNAL Sideways ROM BOARD

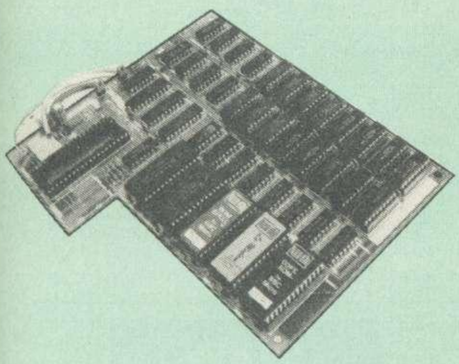
This extremely versatile 12 ROM Socket Board is supplied with power supply, boxed in an attractively finished BBC beige. A second board can be fitted at a later stage to give a total capability of 28 ROMs.

- No soldering required.
- Easy access to ROMs.
- Does not physically interfere with other internal add on boards.
- Built in power supply.
- Write protect for RAM.
- Allows upto 32K Static RAM and 24 ROM Sockets in varied combination.

Price: **£75** (carr **£3**)
(2nd Add-on Board **£30**)

# Watford ROM/RAM CARD

**A must for all serious users**



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with ALL BBC micros (not BBC Plus).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Write protect for ALL RAM.
- Master write protect for all sockets.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Can run ANY BBC ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM/RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM/RAM Board.

The ROM/RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, should the user wish to upgrade in the future. Please write in for further details.

***INTRODUCTORY PRICES:***

| | |
|---|---|
| *ROM/RAM card with 32k dynamic RAM* | ***£45*** |
| *ROM/RAM card with 64k dynamic RAM* | ***£69*** |
| *ROM/RAM card with a massive 128k dynamic RAM* | ***£109*** |

(carriage on ROM/RAM Card £3)

***OPTIONAL EXTRAS:***

| | |
|---|---|
| *16k plug-in Static RAM kit* | ***£7*** |
| *Battery backup* | ***£3*** |
| *Read and Write protect switches* | ***£2 each*** |
| *Complete ROM/RAM board (all options installed)* | ***£125*** |

# Le Modem



## The MODEM from Watford

*At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.*

*The features that make Le MODEM such good value are:*

- *A complete communications terminal that transforms your BBC Micro into a very powerful World/wide data transfer system.*
- *Auto Dials, Auto Answers, Auto Baud selects and is completely controlled by your Micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELESOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON/OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- *FREE 3 months subscription to Micronet and free registration to MicroLink to start you up.*

- *BT Approval applied for.*

Price: **£89** (carr £3)

PROHIBITED from direct or indirect connection to any telecommunication system run by British Telecommunications. Action may be taken against anyone so connecting this apparatus

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

# Nightingale Modem

SPECIAL PRICE to our Customers

**£115**
(carr £3)

(Price includes: Nightingale Modem, Commstar ROM pack, Cables & Comprehensive manual)

| | |
|---|---|
| Nightingale Modem without software | **Only £99** |
| COMMSTAR ROM package only (P&P on modem £2.00) | **£29** |
| Auto Dial/Auto Answer Board | **£48** |
| Auto Dial Utilities Disc | **£9.50** |
| OBBS Bulletin Software | **£20.00** |

## LOGOTRON LOGO

The popular Logotron Logo in ROM. Recommended by most Education authorities.

**Only: £55**

## ISLAND LOGIC MUSIC SYSTEM only: £25

## Viglen Console Unit

Enhance the appearance and convenience of your BBC Micro with the Viglen console unit.

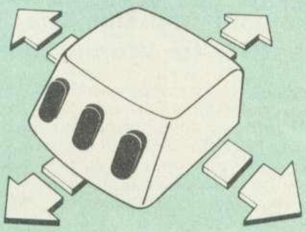
**£42** (carr. £4)

## GLENTOP's 3D GRAPHICS

Development System **£22**

# THE AMX MOUSE

The AMX Mouse needs no introduction. It is simply the best.



**Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.**

**ONLY: £65** (carr £1.50)

| | |
|---|---|
| AMX DESK Package | **£20.00** |
| AMX UTILITY Package | **£12.00** |
| AMX SUPERART Package | **£43** |
| AMX PAGE-MAKER Pack | **£43** |
| AMX 3D ZICON Disc | **£21** |
| AMX Database Disc | **£21** |
| AMX XAM Educational | **£21** |

## Versatile BEEB SPEECH SYNTHESISER Unit




The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

**SPECIAL PRICE £32** (carr £2)

Continued →

## COMPUTER CONCEPT'S ROMS

| | |
|---|---|
| ACCELERATOR | £51 |
| CARETAKER Basic Utility | £27 |
| Graphics ROM | £25 |
| Disc Doctor ROM | £25 |
| TERMI | £27 |
| COMMUNICATOR | £58 |
| SPEECH ROM | £26 |

## Wordwise

The most popular Wordprocessor for the BBC Micro.

Special Offer: **£28**

## Wordwise plus

**£40**

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £20, with every WORDWISE PLUS package bought from us.

## Word-Aid

### The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text/segment area.

Only **£20**

(N.B. Word Aid requires a Disc Interface in your Micro)

### HI-WORDWISE-PLUS

Supplied on disc. This version requires a WORDWISE-PLUS ROM to be present in the machine. It gives up to 44k of text space on the 6502 2nd processor.

**£5**

## Inter SHEET

The most powerful spreadsheet package available for the BBC Micro. Ultra-fast replication and calculation times help make this the easiest to use. It has received very favourable reviews. Unique 105 column screen mode. Supplied in 2 ROMs.

**£40**

## INTER-CHART

This unique program is the only one of its sort on the market. Accepts data from a variety of sources and plots line graphs, bar charts or pie charts. Up to 16 separate charts may be stored in memory. Built in screen dump for EPSON compatible printers, but can use other printer dump routines.

**ONLY: £28**

All Prices Exclusive of VAT

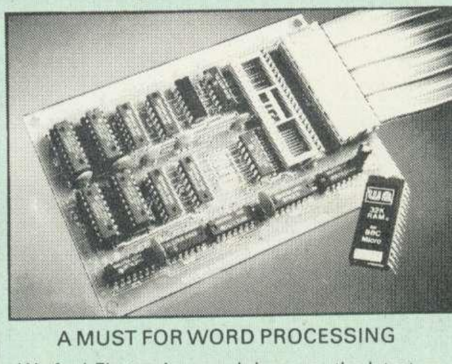
## GRAPH PAD

With this popular Mk II British Micro's Graph Pad, you can add new dimensions to your computer enjoyment. It helps you to create your own applications programs by the simple use of the Graphpad. Ideal for educational use. Supplied complete with cables, Manual and Software Cassette.

**Special Offer £51** (carr £3)

# 32K SHADOW RAM-Printer Buffer

## Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

● IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

● "VIEW" Wordprocessor users can now type in text in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

● In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This superb product is recommended by Computer Concepts for use with both Wordwise and Wordwise Plus. We wholeheartedly agree with this commendation.

● Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.

● Use 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Only a 12K printer buffer can be used in Wordwise or Wordwise Plus due to the way in which they are written. Print large text files while running long graphics programs and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Only 12K Buffer can be used in Wordwise or Wordwise + because of the way these softwares are written.

● Ensure COMPATIBILITY with a vast range of hardware (including Watford & ATPL ROM boards, double density boards, second processors), and software (including BASIC, TOOLKIT, VIEW, WORDWISE (1.20+), WORDWISE-PLUS). This is because our board, unlike those of our competitors, is connected to the computer by a ribbon cable.

● Achieve EASY OPERATION with ROM based software. A large range of commands is available for machine code and BASIC users, including some useful *HELP messages.

**Only: £59** (carr £2)

(Price includes a comprehensive manual and the ROM)

## *INCREDIBLE WORD PROCESSING DEAL ! ! !*

*Watford Electronics, already renowned for quality products at discount prices, are offering, for a limited period only, the truly spectacular BARGAIN OF THE YEAR!*

*A Watford's 32K RAM Card (offering printer buffering and shadow screen RAM facilities) with the well known WORDWISE PLUS Word processor.*

*32K Shadow RAM Card/Printer Buffer and Wordwise Plus (a very powerful package) for the absolutely astounding price of:*

***Only £75*** (carr £2)

*(P.S. For an extra £14, we will include Word-Aid ROM package for the Wordwise Plus, if bought at the same time.)*

## VIEW

VIEW WORDPROCESSOR 2.1 ............... **£39**

## VIEW 3.0 ROM

This latest version features automatic relocation with a 6502 second processor and takes full advantage of any shadow memory fitted. BBC B Plus compatible. Supplied complete with Printer Driver Generator tape.

Price: Only **£60**

## HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

**£38**

| | |
|---|---|
| **VIEWSHEET (Acornsoft)** | **£39** |
| **VIEWSTORE** | **£39** |

### Watford's own Sophisticated VIEW PRINTER DRIVER for Epson FX80 & KAGA KP

**Only £10**

### VIEW DRIVERS FOR JUKI & BROTHER PRINTERS

**Only £10**

### VIEW/VIEW SHEET PRINTER DRIVER for SILVER REED

**(Officially approved by Silver Reed)**

**Only: £10**

## OMNIREADER

### OCR at a price you can now afford

The manually operated omnireader is preprogrammed to read 4 common type faces – including: KAGA Courier 10, Courier 12, Letter gothic & Prestige Elite. It reads a line of text in about 3 seconds & is ideal for inputting already typed material into wordprocessor packages, such as View or WW, Databases or Spreadsheets. Comes complete with power supply, instruction manual, longrule & Dustcover.. Also available on disc for the BBC is a utility program which merges input from the service port with the keyboard thus allowing full editing control whilst using the omnireader. Also included is a Basic program which displays the pixel map image obtained from the omnireader – ideal for doing your own OCR.

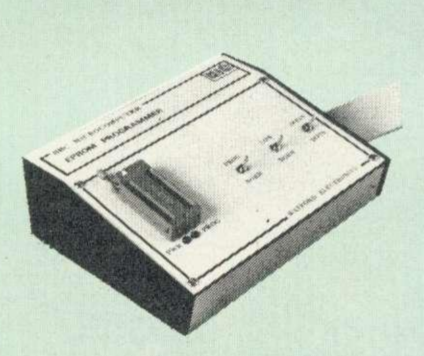
*(As seen on the TV programme Micro LIVE)*

Price: **£175**

## BOOKS (No VAT on Books)

| | |
|---|---|
| 21 Games for the BBC Micro | £5.95 |
| 30 Hour BASIC (BBC Micro) | £7.95 |
| 40 Best machine Code Routines | £7.95 |
| 6502 Assembly Language Program | £19.95 |
| 6502 Application | £11.95 |
| 6502 Assembly Language Subroutines | £19.95 |
| 6502 Development System | £7.50 |
| 68000 Assembly Lang. Programming | £19.95 |
| A Young persons Guide to BBC Basic | £5.95 |
| Advanced Disc User Guide | £14.95 |
| Advanced BASIC ROM User Guide | £9.95 |
| Advanced Machine Code Technique for BBC | £7.95 |
| Advanced Programming for the BBC Micro | £6.95 |
| **Advanced User Guide for BBC Micro** | £11.95 |
| Advanced Graphics with BBC | £9.95 |
| Assembly Language Programming on BBC Micro | £11.50 |
| Advanced Programming Techniques for the BBC Micro | £8.95 |
| Adventure into BBC BASIC | £6.95 |
| Applied Assembly Lang. for BBC | £7.95 |
| Assembler Routines for the 6502 | £7.95 |
| Assembly Language Programming FOR the BBC Micro | £8.95 |
| Assembly Language Programming on the BBC & Electron | £8.95 |
| Basic ROM User Guide | £11.95 |
| Basic User Guide for BBC Micro | £10.00 |
| BBC B+ User Guide | £14.95 |
| BBC BASIC | £5.95 |
| BBC Forth | £7.50 |
| BBC Machine Code Portfolio | £7.95 |
| BBC Micro add on guide | £7.95 |
| BBC Micro Advanced Reference Guide | £10.95 |
| BBC Micro Advanced Programming | £9.95 |
| BBC Micro Book BASIC Sound & Graphics | £7.95 |
| BBC Micro ROM Book | £9.95 |
| BBC Micro **ROM PAGING** System Explained | £2.00 |
| BBC Micro Disc Companion | £7.95 |
| BBC Micro in Education | £6.50 |
| BBC User Guide | £10.00 |
| BBC Wargaming | £8.95 |
| BCPL User Guide | £14 |
| Business Applications on BBC | £7.95 |
| Complete FORTH | £6.95 |
| CP/M - 86 User's Guide | £19.95 |
| CP/M Bible | £16.00 |
| CP/M Handbook with MPM | £9.95 |
| CP/M Plus Handbook | £13.95 |
| CP/M Soul of | £14.95 |
| CP/M The software BUS | £8.95 |
| Creative Animation & Graphics | £7.95 |
| Creative graphics on BBC Micro | £7.50 |
| Disc Drive Projects for Micros | £5.45 |
| **DISC FILING SYSTEM (DFS) Operating Manual for BBC** | £6.95 |
| Disc Programming Techniques | £7.95 |
| Discovering BBC Micro Machine Code | £6.95 |
| Disc System for the BBC Micro | £6.95 |
| Exploring FORTH | £6.95 |
| Filing System & Databases for the BBC Micro | £7.95 |
| FORTH on the BBC Micro | £7.50 |
| Functional Forth for the BBC Micro | £5.95 |
| Games BBC Computer Play | £6.95 |
| Graphics for Children | £6.95 |
| Graphs & Charts on BBC Micro | £7.50 |
| Guide to BBC ROM | £9.95 |
| Hackers Handbook | £4.95 |
| Hackers Handbook - New | £6.95 |
| Handbook of Procedure & Functions for the BBC Micro | £6.95 |
| Interfacing & Robotics on BBC | £7.50 |
| Into View | £4.50 |
| Introduction to COMAL | £9.50 |
| Introduction to LOGO | £6.95 |
| Introducing CP/M on the BBC Micro Z80 2nd Processor | £9.95 |
| Introducing LOGO | £5.95 |
| Introduction to FORTH | £8.95 |
| Introduction to PASCAL | £16.50 |
| ISO -PASCAL Reference Manual | £9.95 |
| Let your BBC teach u to program | £5.45 |
| LISP | £11.95 |
| LISP, A Beginners Guide to | £10.95 |
| Logo Programming | £9.95 |
| **Mysteries of DISC DRIVES and DFS REVEALED** | **£5.95** |
| Mastering CP/M | £17.95 |
| Micronet Handbook | £6.95 |
| Programming the 6502 | £13.95 |
| Programming the BBC micro | £6.95 |
| Programming the Z80 | £16.95 |
| Sencing & Control Projects for BBC | £5.95 |
| S-PASCAL on BBC Micro | £7.50 |
| Structured Prog. with BBC BASIC | £6.50 |
| Termulator Manual | £4.95 |
| The Complete FORTH | £6.95 |
| The Complete Programmer | £5.95 |
| **The Epson FX/KAGA PRINTER Commands REVEALED** | **£5.95** |
| Turtle Graphics on BBC Micro | £7.50 |
| Using Floppy Discs with BBC Micro | £5.95 |
| View Guide | £4.50 |
| Viewsheet User Guide | £10 |
| Using BBC Basic | £6.95 |
| Wordstar & CP/M made easy | £7.45 |
| Wordwise Plus Guide | £9.95 |
| Z8000 Assembly Language Programming | £18 |

## EPROM PROGRAMMER



The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed – wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

**SOFTWARE PACKAGE**
The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette/disc loading). It is a fully purpose designed and ingegrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

**Software facilities include:**
Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.
Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

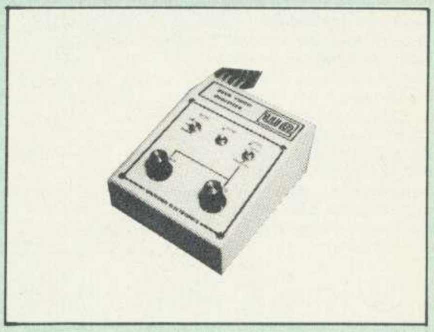
**SPECIAL OFFER £69** (£3 carr.)

## TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
- **ERASER GT** – Deluxe version erases up to 28 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30** (carr £2)
- Spare UV tubes. **£9**

## *BEEB VIDEO DIGITISER*



Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROM's to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

**£110** (Carr. £3)

(Price includes: Digitiser Unit, Software in ROM & a Comprehensive Manual)

## *Magazine Maker*

*(As seen on TV)*

A combination of the AMX Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within AMX Pagemaker to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Pagemaker's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Pagemaker's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£129.00** (carr. £3)

**Continued** →

# DATAGEM

**Now compatible with Watford DFS's**

Long hailed as the most comprehensive and powerful database for the BBC, and now becoming a legend in its own right, DataGem has been significantly reduced in price now that development costs have been recovered by Gemini. Whether you have a single 40 track drive or a Winchester hard disk, this system will make use of ALL your disk space, treating up to 4 drive surfaces as ONE CONTINUOUS FILE. Much has been made and exploited of DataGem's superb selective searching capability, and together with its unmatched mathematical powers, the system provides a really professional database for use in the home, office or school that will harness the full power and potential of the BBC micro.

## AMATEURS & PROFESSIONALS

For newcomers to databases as well as seasoned users, DataGem represents an ideal starting point. Structuring your file and layout couldn't be simpler using DataGem's on-screen 'painting' format. You can have up to 62 fields or data items wherever you want them on a scrolling 120 × 120 card. Colours are all definable, and field data and field titles may be separated if required. Data entered may be stored in up to 8 tiers or 'levels', as well as within the whole database file. Scan one level or the whole database for records that match your search parameters, and place them in another data level for later manipulation. DataGem also boasts limited facilities for producing data merged letters, and may be configured as a 62 cell spreadsheet.

**£49**

# L.B.O. Rom

**Life & Business Organiser**

***– the ULTIMATE BBC utility!***

This is a comprehensive life and business organiser package in 100% machine code which has been very carefully designed to provide a wide range of useful facilities for the busy person at home or in the office, and is simplicity itself to use. Once you start using LBO, you'll ALWAYS use it – not like one of those ROMs you only occasionally call on. LBO will put an end to forgetfulness and ensure that your time is organised, you know what you have to do and when, you don't forget bills or birthdays, and you are reminded constantly of urgent matters.

LBO was written by two graduates in Computer Science from Exeter University in consultation with a lecturer in Cognitive Psychology. It has been very cleverly researched and programmed and is confidently recommended by Gemini as a very superior program for the very superior BBC micro.

Features include:

- Automatic reminder of entries overdue for attention.
- One week's advance notice of forthcoming events.
- Urgent notice board.
- Creation of categories of entries; e.g. bills, birthdays, letters to be written, notepad etc.
- Sorting of appointments by date and time of day.
- Month AND week's summary at a glance, indicating time booked and free.
- Single entry of a RANGE of events and updating of regular happenings.
- Super search facility to call any event by any related word or part word.
- Month by month preview of all forthcoming events.
- Built-in intelligent calendar.
- All data saved to disk.
- Full printer support.
- Easy to follow documentation.

Use LBO to organise your life from today until 1999! It can handle literally hundreds of multi-line messages, as many as you are ever likely to need. Despite the very wide range of facilities offered, this professional program is VERY easy to use and requires absolutely NO knowledge of computers. A vital aid to your everyday life, LBO is GREAT FUN TO USE!

**Price only: £17**

(Also available on DISK)

## *OFFICE MATE*




- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS
- WORD PROCESSOR

**Database** – Ideal for storing all types of information just the way YOU want. Set up a computerised "card index" system and add record/Data to the file your way. Features include Search; Sort; mathematical calculations; printer routines; datasummaries; etc.

**SPREADSHEET** – Offers a wide range of invaluable calculation and editing features. Beebplot will take files created by Beebcalc to provide data portrayal in graph, histogram or pie chart format.

**BEEBPLOT** – Makes full use of the high resolution colour graphics to provide an easily assimilated visual representation of numerical data.

**WORDPROCESSOR** – Provides many routines found in large and expensive packages like: Block delete; Block insert; Search & Replace; Edit text; Display text; etc.

**OFFICE MATE Only £10**

(Cassette or Disc)

## *OFFICE MASTER*




- Cashbook
- Final Accounts
- Mailist
- Easiledger
- Invoices & statements
- Stock Control

**CASHBOOK** – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

**FINAL ACCOUNTS** – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

**MAILIST** – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

**EASILEDGER** – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

**INVOICES & STATEMENTS** – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

**STOCK CONTROL** – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock value, current gross margin, cost of bringing stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21**

(Cassette or Disc)

For fuller description on any of the software titles on this page, please refer to Gemini's own advert in this publication.

# DDD Suite

## The Revolutionary 'Triple-D' BBC Disk

### *Integrated Software System*

### -BASE £26

- Up to 2000 records, 1 search level subset, 26 fields/record, 2 drives, 79 chars/field.
- Scrolling screen, 79 × 26. Interrupt driven real-time clock.
- Layout painted on-screen to your design, including background text/graphics.
- Fully menu driven, with powerful line editor and access to *OS commands.
- Default entry capability, no need for tedious re-typing of repetitive data.
- Lightning search using advanced 'hashing' techniques.
- Powerful maths, allowing all BASIC functions, on any field.
- 10 user-defined variables to simplify complex calculations.
- Multiple level 'intelligent' sort – program only sorts 'out-of-order' data.
- Printed reports in record or summary format. Data spool option for transfer to other files.
- FULL DATA COMPATIBILITY WITH 'DDD-CALC' AND 'DDD-PLOT'

### -CALC £26

- True disk-based spreadsheet, 2000 rows, 26 columns, 52000 cells. Powerful line editor.
- Fast, smooth machine code screen scroll with pop-down menu.
- Individually adjustable column widths with text overflow.
- Full relative and absolute replication.
- Find and move to a row by name.
- User defined variables, delete/insert rows, SORT rows with 'DDD-Base'.
- Send data from all or part of sheet to printer, or just print cell formulae.
- Data over 1 or 2 drive surfaces.
- Fast recalculation, even over large files.
- All BASIC functions allowed, plus 'SUM', 'MAX', and 'MIN'. *OS calls, and real time clock.
- Data spool option for merging with other files.
- FULL DATA COMPATIBILITY WITH 'DDD-BASE' AND 'DDD-PLOT'

### -PLOT £26

- Stunning menu driven colour graphics using the BBC's capability to the full.
- Pie charts, histograms, scatter graphs, line graphs and function plotting.
- Disk save of screen for instant recall within your own programs.
- Superb data entry editor with up to 255 plottable data entries for text and x/y coordinates.
- Automatic scaling with user override.
- Screen customisation allowable after plotting for background text etc., with up to 64 columns in Mode 1.
- Disk save of ALL data.
- Statistics facilities include mean, max, min, standard deviation, line of best fit, correlation coefficient etc.
- Colours re-definable for any plot.
- Epson m/c fully SHADED screen dump with interface for other dumps on request
- FULL DATA COMPATIBILITY WITH 'DDD-BASE' and 'DDD-CALC'

***Combo Pack – All 3 modules***

***£60***

# Money Management

This program is designed for disk users. It allows individual transactions to be stored and retrieved in respect of up to 5 separate Bank, Building Society/Investment accounts AND up to 5 Credit card/loan/Mortage accounts.

The transactions are also analysed – and may be (screen) listed – under 3 separate Income and 15 separate Expenditure headings.

For full details please read Gemini Marketing's advert in this magazine.

ONLY **£11**

## VOLTMACE JOYSTICKS

| | |
|---|---|
| Delta 3B Single Joystick | £10 |
| Delta 3B Twin Joysticks | £16 |
| Delta 14B Single Joystick | £12 |
| Delta 14B/1 Adaptor Module | £12 |
| Transfer Software Disc/Tape | £7 |

## ROM EXTRACTION TOOL

This extremely useful tool allows you trouble free chip removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip.

Price: **£2**

## SURGE PROTECTOR Plug

Fitted in place of your normal mains plug, this device protects your equipment against mains surges. Nearby lightning strikes, thermostats switching and many other sources put high voltage transient spikes on to the mains. This can lead to data corruption in memory and on disc and can result in spuriously crashing machines. A must for every computer user.

Protection for only **£9.50**

## Replacement FLEXIBLE KEYBOARD CONNECTOR

A 'Keyboard to Micro' replacement jumper lead.

**£4**

## ATTACHE CARRYING CASE for BBC Micro

The Attache carrying case is attractively finished in mottled antique brown leatherette. The case is made of tough plywood, providing a very solid and safe way to carry your BBC micro. There is room provided to fit all the leads necessary behind the computer and manuals in the front. Locks supplied with two keys. Price **£13** (£2 carr.)

## DATA CASSETTES

Top grade tested C12 Data cassettes supplied in library cases **35p** each; 10 for **£3.20.**

## SPARES for BBC Micro

| | | | |
|---|---|---|---|
| Keyboard | £46; | Keystrip | £2 |
| Power Supply | £45; | Case | £25 |
| UHF Modulator | £4; | Speaker | £2 |
| Speaker Grill | £1; | Keyswitch | £2 |

**8way DIP SWITCH** **£0.85**

## CONNECTING LEADS

(All ready made and tested)

CASSETTE LEADS 7 pin DIN Plug

| | |
|---|---|
| to 5 pin DIN Plug + 1 Jack Plug | £2.00 |
| to 3 pin DIN Plug + 1 Jack Plug | £2.00 |
| to 7 pin DIN Plug | £2.50 |
| to 3 Jack Plugs | £2.00 |
| **6 pin DIN to 6 pin DIN Plug (RGB)** | £2.50 |

### DISC DRIVE POWER LEADS

Supply from BBC power supply to standard Disc Drive connector.

Single **£3.00** Dual **£3.75**

### DISC DRIVE INTERFACE LEADS

BBC to Disc Drives Ribbon Cable

Single **£4** Twin **£6**

## MISCELLANEOUS CONNECTORS

| | Plugs | Sockets |
|---|---|---|
| RGB (6 PIN DIN) | 30p | 45p |
| RS423 (5 pin Domino) | 40p | 50p |
| Cassette (7 pin DIN) | 25p | 65p |
| ECONET (5 pin DIN) | 20p | 30p |
| Paddles (15 pin 'D') | 110p | 215p |
| BBC Power Plug 6 way | 80p | – |
| Disc Drive Plug 4 way | 75p | – |

**CREDIT CARD 24 HOUR**
**Ansaphone Hot Lines**
**(0923) 50234/33383**

النور

## *ARABIC ROM*

## for the BBC Micro

The ALNOOR ARABIC ROM converts your BBC into a bilingual computer. New keytops provide both English and Arabic symbols. Two sets of Arabic symbols are provided for use in either context sensitive or insensitive operation.

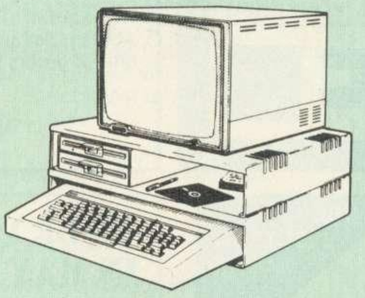
20, 40 and 80 column operation. Compatible with ASMO (449). English/Arabic printer interface software. Numeric entry from either left or right of number. Communications software to send or receive 7 or 8 bit data.

Different shapes of Vowels (e.g. Shadda, Fatha, etc). Different shapes of Hamza. Full English and Arabic character sets with all special characters.

**£85**

(Price includes Alnoor ROM, Operating Manuals & a full set of Arabic/English Keytops)

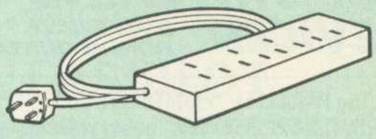
## PLINTHS FOR BBC MICRO AND PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

| | |
|---|---|
| SINGLE BBC PLINTH | **£11** (carr. £1.50) |
| DOUBLE BBC PLINTH | **£20** (carr. £2.00) |
| PRINTER PLINTH | **£10** (carr. £1.50) |
| SINGLE MASTER PLINTH | **£14** (carr £1.50) |

## 4 WAY MAINS DISTRIBUTION SOCKET



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals. Allows the whole system to be switched on from one plug.

**£9.50** (carr £1.50)

## *ACORN MUSIC 500*

The Acorn Music 500 System is probably the most powerful piece of music generating hardware available for the BBC Micro.

**£72** *(carr £4)*

**28 pin ZIF SOCKET (Textool)** **£6.95**

### 28pin DIL HEADER PLUG

| | |
|---|---|
| SOLDER type | £1.50 |
| IDC CRIMP type | £1.95 |

## RIBBON CABLE

28way **55p/ft;** 34way **60p/ft.**

## SOLDERING IRON

(Antex 17 Watt)

| | |
|---|---|
| Ideal for electronics PCB work | £6 |
| Soldering Iron Stand | £2 |
| 18 SWG Solder in dispenser | £1 |
| 22 SWG Solder in dispenser | £1.50 |

## CHIP SHOP

| | |
|---|---|
| 2764-250nS | £2.00 |
| 27128-250nS | £3.00 |
| 4013 | 60p |
| 4020 | £0.90 |
| 4816 RAM | £1.00 |
| 6264LP-8K RAM | £3.75 |
| 6502A CPU | £5 |
| 6522 | £3.40 |
| 7438 | 40p |
| 74LS00 | 25p |
| 74LS04 | 25p |
| 74LS10 | 25p |
| 74LS123 | 80p |
| 74LS163 | 70p |
| 74LS244 | 80p |
| 74LS245 | £1 |
| 74LS393 | £1.20 |
| 8271 | £36 |
| DS3691 | £3.50 |
| DS88LS120 | £3.00 |
| LM324 | £0.45 |
| SN76489 | £5.50 |
| SAA5050 | £8.75 |
| UPD7002 | £4.40 |

**ASSORTED ROMS**

| | |
|---|---|
| ACORN BASIC 2 | £16 |
| ACORN ADFS | £25 |
| ACORN DNFS | £17 |
| Acorn OS 1.2 | £6 |
| Acorn BCPL | £42 |
| Basic Editor | £25 |
| Acorn COMAL | £36 |
| Acorn FORTH | £32 |
| Acorn Graphics | £25 |
| Acorn LISP | £35 |
| Acorn LOGO | £42 |
| ISO Pascal | £42 |
| ICON Master | £28 |
| Logotron LOGO | £55 |
| Micro Prolog | £64 |
| ROMIT | £29 |
| Serial ULA | £13 |
| Video ULA | £15 |
| TERMULATOR | £25 |
| MUROM | £21 |
| SLEUTH ROM | £24 |
| STUDIO 8 Disc | £18 |
| Toolkit Plus | £31 |

**ACORN'S GRAPHICS EXTENSION ROM**
**GXR-B £21.00 GXR-B+ £22.00**

**Prices subject to change without notice and available on request. All offers subject to availibility.**

MAIL ORDER AND RETAIL SHOP. TRADE AND EXPORT INQUIRIES WELCOME.
GOVERNMENT AND EDUCATIONAL ESTABLISHMENTS OFFICIAL ORDERS ACCEPTED.

**CARRIAGE:** Unless stated otherwise, minimum £1 on all orders; £2 on larger items and on bulkier items, £7 Securicor charge applies. Overseas orders are charged at cost.

**VAT:** UK customers please add 15% VAT to cost incl. Carriage.

**SHOP HOURS:** 9.00am to 6.00pm. Monday to Saturday. (Ample Free Car Parking Spaces)

# Watford Electronics

**JESSA HOUSE, 250, Lower High Street, WATFORD, ENGLAND**
**Telephone: (0923) 37774; Telex: 8956095 WATFRD**
**Credit Card Orders ACCESS or VISA Telephone: (0923) 50234/33383**

# SOLID STATE DESK TOP SWITCHING DEVICES

*(FULL TWELVE MONTHS GUARANTEE)*

keyzone

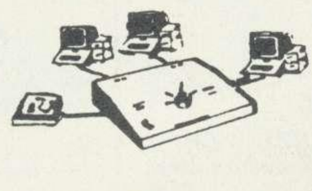
**The PARALLEL "PRINTERSHARER", "PRINTERCHANGER" & "PRINTERCROSSOVER" being solid state would allow use of much longer cables. We have successfully installed systems with up to 30M on input and output without data loss or errors**

**DON'T PUT UP WITH THE ODD MISSING OR WRONG CHARACTERS – USE KEYZONE SOLID STATE SWITCHES.**

***"PRINTERSHARER"***
***"SEVERAL MICROS TO 1 PRINTER"***
***OR***
***"PRINTERCHANGER"***
***"1 MICRO TO SEVERAL PRINTERS"***

***PARALLEL – 26 PIN (as BBC)***

| | |
|---|---|
| *3 WAY (without cables)* | ***£60** (b)* |
| *3 WAY – with 3×2mt computer cables* | ***£75** (c)* |
| *6 WAY (without cables)* | ***£110** (c)* |
| *6 WAY – with 6×2mt computer cables* | ***£140** (c)* |
| ***SERIAL** RS232 3 WAY –* | ***£65** (b)* |
| *RS423 3 WAY –* | ***£40** (b)* |



## *THE PRINTERCROSSOVERS*

*(2 MICROS TO 2 PRINTERS)*

| | |
|---|---|
| *PARALLEL – 26 PIN* | ***£70** (c)* |
| *SERIAL RS232* | ***£70** (b)* |
| *RS423* | ***£45** (b)* |



*PRICES ARE EXCLUDING VAT. Postage: (b)£2, (c)£2·50*

*CENTRONICS (36 PIN) PRINTERSHARERS, PRINTERCHANGER & PRINTERCROSSOVERS AND FOR IBM, SIRIUS, APRICOT, MACINTOSH, COMMODORE, 26 PIN APPLE II+, IIe & IIc AVAILABLE.*
*FOR PRICES AND LEAFLETS PLEASE CONTACT:*

***KEYZONE LTD***
*U14, REGENERATION HOUSE, SCHOOL ROAD, PARK ROYAL, LONDON NW10 6TD.*
*Telephone: 01-965 1684/1804 Telex: 8813271*

Access VISA

# ★ THE COMPATIBLE KEYPAD ★

**GUARANTEED TO WORK WITH ALL SOFTWARE OR WE GIVE FULL REFUND!**

**BBC B £44.95**

**CBM 64 £29.95 Inc. P&P & VAT**



- NOT software driven saves TIME and MEMORY.
- Simple fitting with adaptor connector.
- Leaves all ports free.
- Full travel key switches.

Cheques/PO's to;- **COMMERCIAL PRODUCTS**
**11 Hylands Close, Furnace Green, Crawley, Sussex RH10 6RX tel (0293) 30174**

*Ground Control*

# EPROM EQUIPMENT

UVIPROM is an EPROM programmer for the BBC Micro (with DFS). UVIPROM 1&2 are for 2764/27128 EPROMs (21V Vpp) and the UVIPROM 32&32+ are for 27256 EPROMs (12.5V Vpp).

| | | | |
|---|---|---|---|
| UVIPROM 1 | **£20.95** | UVIPROM 2 (with ZIF) | **£25.95** |
| UVIPROM 32 | **£21.00** | UVIPROM 32+ (with ZIF) | **£26.00** |
| Software, including fast algorithm:– UVP 2.1 ROM | | | **£ 8.00** |

The compact (90 × 80 × 40mm) UVIPAC EPROM erasers can handle up to 3 EPROMs at a time.

| | | | |
|---|---|---|---|
| UVIPAC | **£21.45** | UVIPAC (T) with 15 min. timer | **£26.45** |
| UVIPAC (TS) with 15 min. timer and time out sounder | | | **£28.45** |

We also sell EPROMs at competitive prices, phone or write for details. Access/Visa welcome. **Prices include P&P and VAT.** Send cheques or official orders to:–

**GROUND CONTROL**
**Alfreda Avenue, Hullbridge, Essex SS5 6LT**
**Telephone: 0702 230324**

# ROOM 7 SOFTWARE

BBC
ELECTRON
MASTER

**Discounts available on multiple orders.**
**All prices inclusive of postage & packing**

**Accounts**

**EASY BANKER. SPECIAL OFFER, NORMALLY £12.50 – £8.50 IF ORDERED THIS MONTH.**
Handles up to 20 accounts per disc, approximately 1000 transactions per 40 track disc. also handles regular income and expenditure, standing orders, on a weekly or monthly basis. £8.50 (inclusive of VAT). DISC ONLY 40/80 MODEL B.

**PAYROLL EXTENDED** – With personnel records, up to 400 employees, paid weekly, fortnightly, four weekly or monthly. Reports given for income tax and national insurance due for each employee, coin analysis and bank summary. (Micro aid) DISC ONLY 40/80 £49.95 + VAT. MODEL B, MASTER, AMSTRAD.

**MICRO-TRADER ACCOUNTS AND STOCK CONTROL**
Handles all aspects of business accounting, including VAT, invoicing, statements, end of year accounts. Fully integrates with the stock control package (Meadow). Used by ourselves, we can give a demonstration by appointment. Micro-Trader Accounts £200 + VAT. Stock-control £95 + VAT DISC ONLY 80 TRACK, MODEL B AND MASTER.

**BUILDERS/ARCHITECTS/SURVEYORS/EDUCATIONAL**
**"All-in-rate" Calculator.**
Calculates "costs to employ" rates. Sample data files and instructions for use provided. This easy to use program instantaneously recalculates new all-in-rates and provides printouts for use with our electronic price book program or for manual use. Provision is made for calculation of "gang rates." £15 + VAT. 40/80 Track.

**Electronic Price Book (V1)**
Allows the operator to create and store their own personal price book and print out copies. Each item can be coded. own descriptions inserted, labour hours, labour costings for each item, materials column. £45 + VAT. BBC B 40/80 Track.

**Electronic Price Book (V2) Extended**
As above but in addition caters for 10 all-in-rates and 10 profit percentages per section. 14 sections per data disc. Allows the use of one to four disc drives. Will eventually integrate with estimator package. All-in-rate calculator included. £95 + VAT. BBC B 40/80 Track.

**Pocket Engineer (Ideal for Builders, Architects and Students)**
Designed to calculate steel and timber beam sizes in domestic situations on small extensions. The printouts have been used by our associate surveying practice and save time with Building Control Submissions. £30 + VAT. BBC B 40/80 Track, TAPE.

**Bespoke Programming/Conversion work** – Write/ring for information.
**Software marketing** – If you have a good program but can't afford to advertise it write/ring us. Maybe we can advertise it for you on a commission basis.
Letters/cheques to: W.L. Computer Services, Dept 2, First floor, H.S.L. Buildings, 437 Warrington Road, Rainhill L35 4LL. Enquiries welcome 051-426 9660.

# TO BE UNLOCKED IN MAY – AN EXCITING ADDITION TO OUR RANGE



## The Amazing new 64K Eprom programmer

New on the market this promises to be the most powerful Eprom Programmer available, at a price which makes it available to the home user as well as the business user, designed to offer every conceivable requirement with a specification that leaves our competitors a long way behind. Attractively cased in a metal custom-built sloping box with ZIF socket, and plugs into 1MEG BUS, contains own power supply.
**Specification:** will program (5v single rail), 2516, 2716, 2732, 2764, 27128, 27256, 2532, 2564, 27512, ie most devices 2K to 64K, 2732A, 2764A etc. Program voltage software selectable 25v, 21v,12.5v, selectable programming method allowing high efficiency programming for 8K and above devices. 32K Eproms and smaller can be programmed in one pass, 64K Eproms can be programmed, fully buffered output line, ZIF powered down automatically unless programming/reading. Clear simple to use software supplied on Eprom. Consists of, copy Eprom into Ram generate checksum, blank check list faults, automatic verification and list errors, full screen memory editor, save buffer to file, load buffer from file, several basic programmes can be stored on one Eprom. Plus many more facilities, no switches, totally software driven.

## Limited Special Offer

H.C.R. has slashed the price of the Micron Eprom Programmer
A quality product direct from the manufacturers, contained in a sloping box with ZIF socket. Comes complete with cables, instructions and menu driven software. Allows, Eprom blank check, compute checksum, verify byte by byte, generates header code for basic programmes, load data from tape/disc to buffer, save buffer to disc/tape, allows start address to be changed, plus even more facilities. Programmes, 27128, 2764, 2732, 2532, 2716, 2732A, uses high efficiency algorithm for 2764 and 27128 reducing programming time by 90%.

| | |
|---|---|
| **Normal Price £46.50 + VAT (£6.97)** | **Total £53.47** |
| **Special Price £35.00 + VAT (£5.25)** | **Total £40.25** |
| **Post £1.00 + VAT** | **64K Micron Plus price on application** |

**H.C.R. ELECTRONIC SERVICES**
**H.C.R. House, Bakers Lane, Ingatestone, Essex CM4 0BZ**
**(0277) 355407/8**
**ACCESS and VISA welcome**

# Synergy Software

'PROFESSIONAL Software for the BBC Micro'

BRITISH BROADCASTING CORPORATION MASTER SERIES MICROCOMPUTER

## RAPID READER

IF YOU CAN READ THE FOLLOWING PASSAGE OF TEXT IN UNDER 15 SECONDS . . . YOU NEED READ NO FURTHER!. . . START TIMING NOW.

In line with our reputation for producing ORIGINAL and USEFUL software we have created a package designed to teach you to read at speeds you never thought possible. RAPID READER is a comprehensive, flexible and powerful speedreading course which employs a variety of reading enhancement techniques and simulates sophisticated mechanical reading aids (eg Tachistoscopes, Pacers, Reading Machines etc), at a fraction of the price! In addition, RAPID READER has been designed to enable teachers and parents to devise their own training courses, using Wordwise or View wordprocessor ROM's, to teach good reading techniques to their pupils or children. Each two disk RAPID READER package can provide separate individually tailored courses for up to 40 participants and will maintain and chart 'progress reports' for each individual.

STOP TIMING – Check your rating:
40 seconds = slow, 35 seconds = average, 20 seconds = fast, 15 seconds = very fast.
Whichever rating you achieved we would expect the average user to read at least 50% faster by the end of the course. A LIFETIME INVESTMENT AT £27.95. WRITE FOR DETAILS.

## EASIPLOT

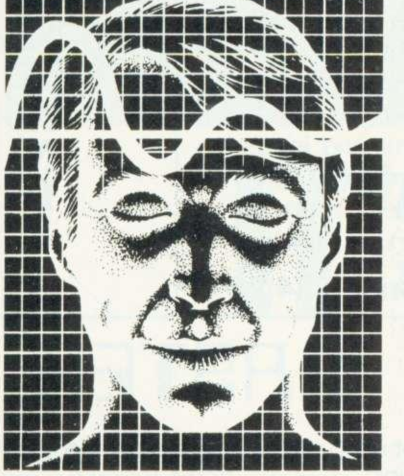
**"a very good program" A + B Computing**
**"excellent" Which? Software Guide**

Easiplot is a sophisticated and user friendly BUSINESS and EDUCATIONAL graph package. Voted the 14th best educational program, Easiplot has come to be regarded as an outstanding business package and excellent value for money.

**COMPREHENSIVE FACILITIES INCLUDE:**
★Line, Bar, Pie, Scatter and Data charts
★5 line or bar merging
★Bar/Line conversion option
★Auto or manual scaling
★Comprehensive label and edit facilities
★Screendump for Epson compatible printers
★Save/Load options on single or dual drives
★Provides easy access to screendump ROM's
★Grid and screensave facilities
★56 page USER MANUAL

## BIOGRAM

**'This original and imaginative package is excellent value for money...it provides the user with a very cheap near equivalent of a dedicated professional system costing many times its purchase price.' A&B Computing (JUNE 85). "GOOD VALUE FOR MONEY" MICRO USER (NOV' 85)**



BIOGRAM is a new concept in computer software and provides you with the tools to control your state of relaxation and response to stress.

BIOGRAM uses proven biofeedback techniques to provide you with audio/visual impressions of your physiological and psychological state.

Your stress level is detected by two electrodes and is converted and relayed to the computer by the electronic BIO-MODULE. The BIOGRAM software translates this signal into a form that will enable the user to learn to influence his own state of mind.

BIOGRAM is FUN and EASY to use, just plug in the module, attach the electrodes and choose your program. Ready to run in seconds.

The BIOGRAM system comprises an electronic bio-module fitted with plugs and electrodes and a suite of programs on disk or cassette. The bio-module is supplied in two versions:
BIOGRAM I – a standard, medium sensitivity unit
BIOGRAM II – a high sensitivity unit with a three-way sensitivity booster switch.

The BIOGRAM software package includes:
★RELAXOGRAM – a multi-level relaxation trainer and progress tester.
★LIE DETECTOR – a graphical lie detector with an automatic interrogation facility.
★P.REDUCER – a programmable phobia identifier and reducer.
The comprehensive user Manual provides many examples of biofeedback applications and experiments to try.

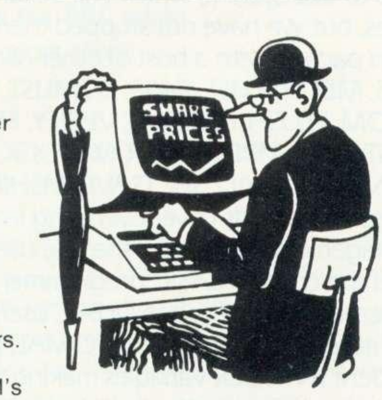
HARNESS THE POWER OF BIOFEEDBACK – LEARN TO CONTROL YOUR FEARS, PHOBIAS and STATE of TENSION. AN INVESTMENT FOR THE WHOLE FAMILY.

## SHARE ANALYSER

**'an excellent program'** ***Micro User* – Jan 85**
**'an invaluable aid'** ***Northern Echo***
**'very highly recommended'** ***Which? Software Guide***
**'Excellent investment'** ***Luton News***

Share Analyser is a comprehensive reporting, analysis and charting package for the BBC Micro. Transaction and share price databases are built up for each share name and a variety of report and analysis facilities can be instantly accessed. Reports can be produced on any printer. Share Analyser is easy to use and is supplied with a comprehensive Operating Manual.

FACILITIES INCLUDE:
★Up to 20 share names per portfolio per disk.
★Use as many disks as you require
★Capacity per disk – 20,000 whole number share prices and 320 purchase/sale/dividend records
★Reports include Valuation, Profit Statements, Movement Analysis, Transaction Reports etc
★Graphics facilities include Moving Averages, Rise and Fall, Superimpose, Magnification, Grid, Screenwrite, Screendump for Epson compatible printers.
★Adjusts for scrip issues etc.
★Provides access to screendumping ROM's




All Easiplot and Share Analyser specifications are for the disk version. FULL DETAILS OF ALL OUR PRODUCTS ARE AVAILABLE ON REQUEST.

| Prices include p + p etc – no extras | PRICE |
|---|---|
| Biogram 1 (cassette or disk). . *BBC B & B+* | £37.95 |
| Biogram 2 (cassette or disk). . *BBC B & B+* | £47.95 |
| Easiplot (cassette). . *BBC B, B+ & Electron* | £15.95 |
| Easiplot (including Dataplotter – disk). . *BBC B & B+* | £24.95 |
| Rapid Reader (disk only). . *BBC B & B+* | £27.95 |
| Share Analyser (cassette). . *BBC B, B+ & Electron* | £17.95 |
| Share Analyser (disk). . *BBC B & B+* | £24.95 |

DISK orders . . state 40 or 80 track (add £3 for overseas orders – Biogram £5) Write or telephone for further details (05827) 2977 (Ansaphone Service). ALL PROGRAMS ARE NORMALLY DESPATCHED BY FIRST CLASS POST WITHIN 24 HOURS AND ARE GUARANTEED FOR 12 MONTHS. Available MAIL ORDER only. **ALL DISC PROGRAMS MASTER COMPATIBLE**

**Send cheques/PO etc to Synergy Software, Dept A 7 Hillside Road, Harpenden, Herts AL5 4BS**

ALL SOFTWARE AVAILABLE ON 3'' DISKS

# CHALICE

SOFTWARE/HARDWARE

ASK ABOUT B+ COMPATABILITY

## VECTOR 1

*TAPE TO DISK UTILITY*

**Features**

+ Once only purchase
+ Can save to any disk
+ Very user friendly, help pages on disk
+ 40/80 Format
+ No awkward ROMs, can be used on any machine
+ Can load to all available RAM &400–&7FFF
= Simply the best tape to disk utility available

Vector 1 versions compatible with Acorn, Opus, UDM, Cumana, BBC+ & Watford (Not 1-42, 1-43) DFS's.

## VECTOR 2

*DISK UTILITY*

**Features:**

+ 40/80 Format
+ User friendly, menu driven
+ Contains powerful features such as a disk sector editor, Disk Compare, format, verify and track repair
= The most powerful disk utility available

**Prices**: £12.00 each for Vector 1 or Vector 2 £23 for both.

**MUST NOT BE USED TO INFRINGE COPYRIGHT**

**Please specify DFS when ordering**

## *HIGHWAY CODE*

A program to teach traffic signs

★ High resolution colour signs

★ Concept Keyboard option

★ Learning mode to allow student to learn at leisure

★ Examination mode

DISK ONLY £11.95

**NEW ★ RELEASE ★**

## MEGA-ROM

The latest release from Chalice software, over 60 commands on a 16K ROM. The range of commands available means that there is something for every BBC user. For the disc user the ROM provides a skewed formatter to speed up disc access, a disc sector editor, disc search, verify and repair utilities, a useful free space command, plus many other handy commands. For the BASIC programmer, commands include search and replace on a global or selective basis, list active variable values, append BASIC program, move and copy lines, bad program repair, a highly effective routine to shrink BASIC programs down to a far smaller size etc. Other commands include disassembly, memory edit, graphics compilation, comprehensive file transfer utility, function key lister, envelope lister, rom lister, rom save, full rom status, switches roms off through <CTRL><BREAK>, send commands straight to a ROM, KEEP command, inverse video command, a command to send codes direct to your printer, memory search, base conversion, display character definitions, close open files and many others. All commands have been chosen on the basis that they are useful and not as space fillers.

**Introductory price £34.95**

**OVER 60 COMMANDS**

## *the SCYTHE*

The Scythe toolkit contains a version of the VECTOR 1 tape to disc system, which will transfer most protected tapes, but we have not stopped there. The Scythe has been packed with a host of other commands: MDIS, SDIS, MEDIT, KLIST, BASE, ROMLIST, ROMSAVE, NROM, FLUSH, FORMAT, VERIFY, FREE, SFIND, BFIND XLIST, BAD, MRELOC, SLOW, TDISK, VECTOR, ROFF, RON, SECTLOAD, SECTSAVE, MSHIFT & MSWAP. These commands cover everthing from ROM management, utilities for the disc user, aid for the machine code or BASIC programmer, and a set of general utilities of use to all BBC users. The commands will accept input in HEX, DECIMAL, BINARY and the resident INTEGER variables making the Scythe very easy to use. The Scythe comes complete with a comprehensive manual and a free utilities disk.

**PRICE £24 INCLUSIVE**

## ROM MASTER

ROM Master is a budget utility ROM designed for people with several ROMs on their BBC computer. ROM master has several utilities to help prevent the interference which can occur between different ROMs, any ROMs that cause problems can switched off even through <CTRL> <BREAK>. Using ROM master has been designed to be as easy as possible. Most commands will accept lists, so you can, for example, switch off several ROMs with just one command. ROMs can be specified their socket numbers or their title or even abbreviations of the title. 20 commands are available, please send for full details.

As a bonus feature for anyone who has files they want to keep from prying eyes, ROM master contains the commands SCRAMBLE & UNSCRAMBLE which will encrypt or de-encrypt file based on an entered password. The encryption used is high sophisticated so unless you know the correct password the file cannot be read.

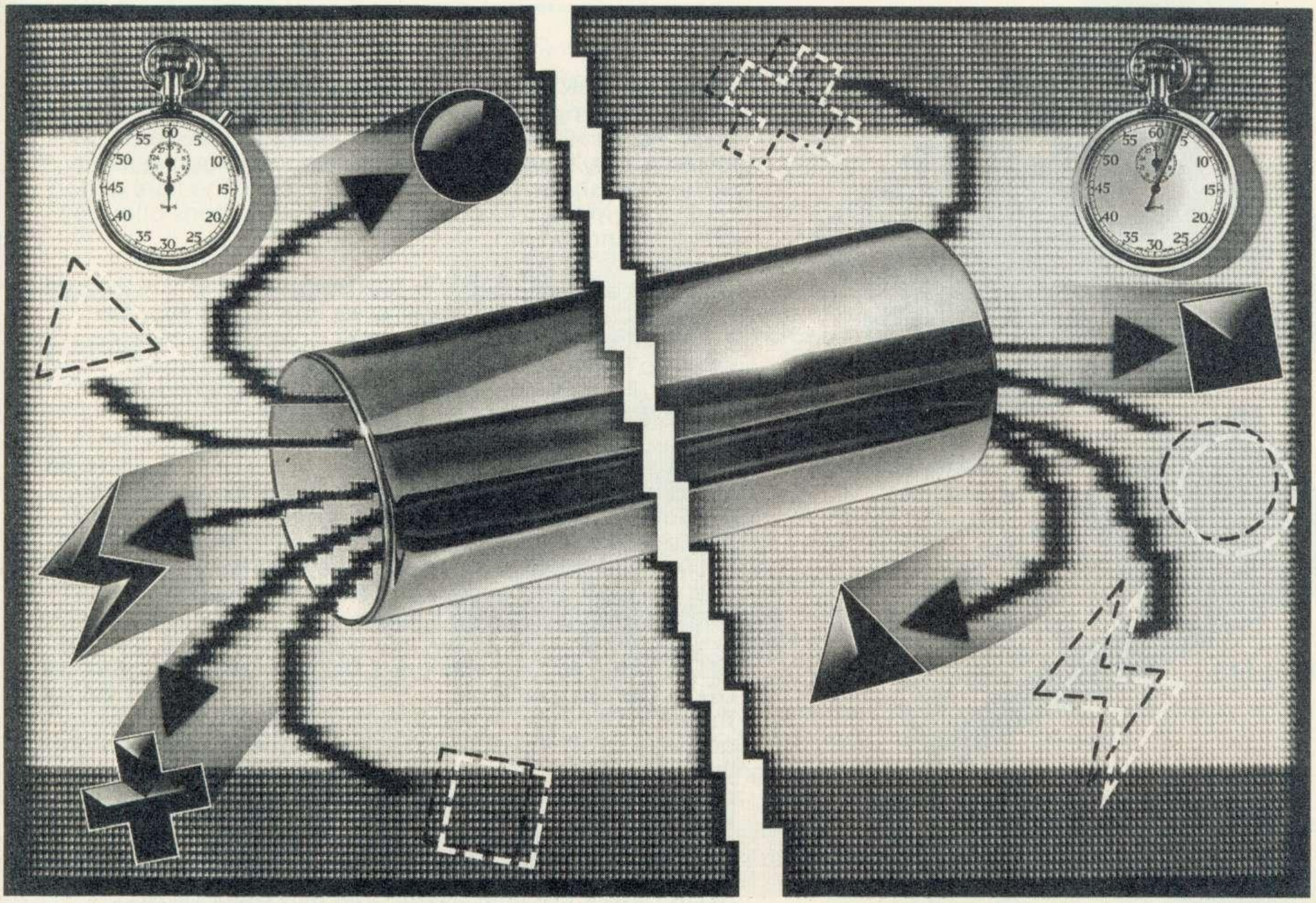
**PRICE £14.95**

Orders to:
CHALICE SOFTWARE, Dept AU
3 Merlin Way,
Covingham,
Swindon SN3 5AN.

Access

*All Enquiries Please Ring:*
*0793-615026*
*Dealer Enquiries are Welcome*

All prices shown include VAT and p&p. Please add £3.00 per disk if you require 3'' disks and specify when ordering.



# IT'S QUICKER BY TUBE

**Speed up data transfer across the Tube by including software in the BBC micro and second processor to enable them to communicate with each other**

*Martin Chaplin*

This article forms the final part of a discussion of extensions to the 6502 second processor HiBasic. The first part, in March, described an improved and extended assembler to take full advantage of the more advanced 6502 chips now in use.

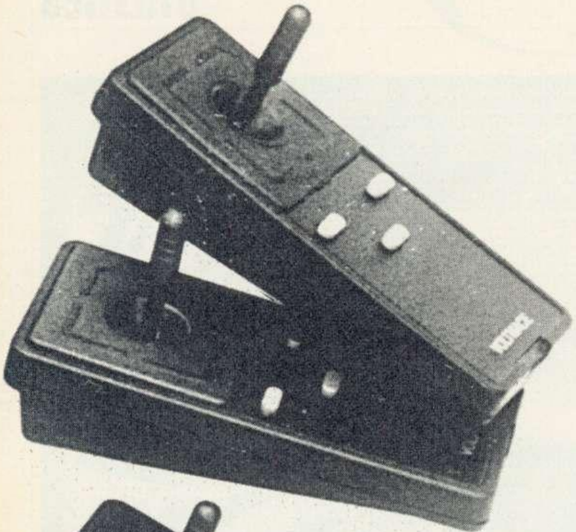
The 6502 second processor for the BBC micro is clearly a very useful addition to the system. It allows the use of a more powerful 6502 chip, faster programs and significantly more RAM. It is connected to the BBC micro through the Tube interface which allows both microprocessors to share the work by running in parallel.

There are some fairly unsophisticated facilities provided for transferring bytes across the Tube which are documented in the user guide. OSWORD calls 5 and 6 allow the second processor to read from, and write to, the BBC micro motherboard, and OSBYTE calls &92 to &97 read from, or write to, the mapped input/output pages &FC, &FD and &FE. These calls, however, only transfer one byte at a time. Given the speed of operation possible for the Tube operation (up to 100,000 bytes/second), this speed of transfer is miserably slow, at about 1500 bytes/second. So we need faster operation in both directions.

The programs presented here set up such a system and allow it to be incorporated into a Basic program by assigning the unusued keyword token &CE to the introduced keyword 'TUBE'. A complete mode 2 screen (20,480 bytes) can be transferred in just over 210 milliseconds in a Basic program. The CALL keyword function is also extended to allow calls to be made from a Basic program in the second processor to machine code in the

ILLUSTRATION BY PAUL ALLEN

# JOYSTICKS— THE COMPLETE SOLUTION



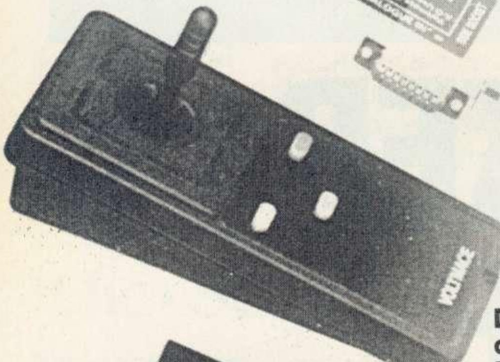
Delta 3B Twin



Delta 14B



Delta 14B/1



Delta 3S and Delta 3B Single



Datapad 16B

**DELTA 3B TWIN—BBC B or ELECTRON PLUS 1 — £19.95**

A direct but improved alternative for the original ACORN joysticks, with 2 joysticks wired to one plug. As with all our joysticks they have the fast action sprung to centre return of the steel shafted nylon covered joystick. The light action makes them ideal to hold and the 3 fire buttons allow left or right-handed use.

**DELTA 3B SINGLE—BBC B or ELECTRON PLUS 1 — £12.00**

A single joystick that in some ways can act as two. The custom made special "low noise" potentiometers are wired so that it will work as a left hand or right hand joystick. It can even run some programs written for two joysticks and has the fire buttons of both.

**DELTA 14B—BBC B — £14.95**

Our original ACORN/BBC handset. The same super light joystick, but the long life buttons, which have been video game tested for many years, increased to 14 in number. A DELTA 14B/1 is needed to run the keypad but a 14B on its own will work as a joystick and fire buttons, so you can always add the 14B/1 to it later.

**DELTA 14B/1 for use with 1 or 2 DELTA 14Bs — £14.85**
**DELTA DRIVER CASSETTE — £5.95**

The A/D/USER PORT interface box. This gives simultaneous access to both the analogue port, for the joystick part and the user port, for the keypad. Two handsets can be plugged into the box giving a total of 24 user definable keys.
Full instructions are provided to include the keypad in your own programs even in BASIC or for the non-programmer a DELTA DRIVER cassette is available with keyboard to joystick/keypad conversions and keypad set up programs.

**DELTA 3S (for ELECTRON with switch joystick interface) £12.00**

For an ELECTRON with a switched joystick interface (Not a PLUS 1) this gives you the same delightful light, fast action of the DELTA joysticks but fitted with a 9 way D plug as per Atari, Commodore, etc. and will run on First Byte interface or similar.

**DELTA ASC/B FOR BBC, DELTA ASC/E FOR ELECTRON PLUS 1**
(not illustrated) **£9.95**

This little box plugs in series with your analogue joystick to alter its characteristics simply by using a switch. In one set up the joystick will act like a switched joystick, i.e. a slight movement will act as if the joystick has been pushed hard over. In the other mode the joystick only covers the centre half of the A/D converter so that it takes twice as much movement to give the same effect. This makes it much easier to make delicate adjustments to programs like flight simulators.

**DATAPAD 16B — £39.95**

A commercial spec. 16 way keypad. Full travel mechanical keys with double shot moulded keycaps mounted in a low profile metal case. The keys are marked with calculator legend, but the software included allows the pad to be defined as any keys, including function keys or single byte VDU commands such as PRINTER ON/OFF. No tampering with the computer as it fits onto the user port.

Access

Available from your dealer or direct from us

VISA

AA57

**Voltmace Limited**

Park Drive
Baldock
Herts
SG7 6EV
Telephone (0462) 8944

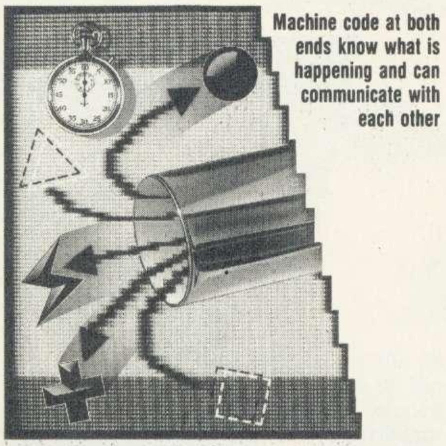
BBC micro's RAM or paged ROM. The paged ROMs can be selected by an OSBYTE call (OSBYTE &A4 or *FX164), making use of a previously unused OSBYTE parameter.

The problem with fast byte transfers across the Tube is mainly concerned with letting one end know what the other is doing! This is satisfactorily solved by including machine code at both ends which know what is happening and can communicate with each other.

### Tube registers

There are eight Tube registers at either end, four are 'status' which indicate whether there is a byte waiting to be read (bit 7 set, =1) or transmitted (bit 6 reset, =0) in the adjacent 'data' channel. The status bytes are easily read by the BIT instruction followed by BPL (bit 7 tested) or BVC (bit 6 tested) branch instructions. The first pair of registers is reserved for OSWRCH calls (graphics and text), the second pair is used for other operating system calls (eg, OSBYTE and OSWORD), and the other two pairs for the filing system. The easiest pair of registers to use is the one used by the OSBYTE calls as this is checked regularly (up to 140,000 times/second) by the BBC micro.

The main byte transfer routines in my program use the unassigned OSBYTE code 164 (&A4). This entails sending a reason code (=6) followed by two data bytes and then the code (=164) to Tube channel 2. The reason code determines the jump address (&500 + reason code) in the BBC micro: in this case it jumps to the code for OSBYTEs greater than 159. The two data bytes are interpreted as the registers X and Y. The remaining data is sent



**Machine code at both ends know what is happening and can communicate with each other**

after this OSBYTE code. If this data is absent, the new code at the BBC micro end treats the call as a straightforward *FX164 call to check the presence of the code or change the ROM accessed (see later).

In either event, the data is redirected from the OSBYTE vector (&20A-&20B) to the new code. After the byte transfer has been completed the second processor continues to execute its HiBasic interpreter and the BBC micro returns to its idler routine between &36 and &45 in zero page.

By choosing this rather indirect way of using OSBYTE &A4, the programs avoid notifying the second processor end of the Tube that OSBYTE has been used. If it was notified, it would annoyingly insist on waiting for the return byte which would both complicate and interfere with the byte transfer process.

### Buffers

The buffers chosen for the programs perhaps need some comment. Locations &57-&8F in the BBC micro and &4F-&8F in the second processor are free in page zero.

The BBC micro has an extended character set which changes its PAGE to OSHWM +&5FF leaving the first free location as &1F00 (disc system) or &1400 (tape system). &1F00 is the address chosen for this program although other RAM may be used (eg, &A00) under certain circumstances.

The machine code at the second processor end has been put immediately below HIMEM, to enable it to be saved with the changed HiBasic, although again another RAM area

## LISTING 1 PROGRAM NOTES: TUBE EXTENSIONS: SECOND PROCESSOR

This program (listing 1) should be run in the 6502 second processor under HiBasic.

The machine code generated is automatically saved, with the correct reload and execution addresses, as X_HIBAS in directory M. This code only operates with the code generated by the second program (M.IOTUBE) and may be run by:

*RUN M.IOTUBE <RETURN>
*RUN M.X_HIBAS <RETURN>

**160-170:** Second Tube channel
**190:** &50 holds the direction of byte-transfer (=&FF, 2nd -> IO;=0, IO -> 2nd; =1, CALL code)
**200:** &51-&52 hold the address in the BBC micro
**210:** &53 holds &A4, the new OSBYTE code
**220:** &54-&55 hold the number of bytes to be transferred
**230:** &56 holds 6, the reason code expected by the Tube for OSBYTE calls > &7F
**240:** &57-&58 hold the address in the second processor
**300:** evaluates an integer expression
**310:** cold start entry into HiBasic
**320:** gets next byte pointed to by (pointer), offset
**330:** continue HiBasic interpreter
**400-440:** code moved from HiBasic to make way for Tube keyword entry
**450-530:** checks whether TUBEGET or TUBEPUT is being used. &A5 is the token for GET
**610-640:** discards unwanted letters
**670-950:** assembles addresses for Tube transfer from parameters in the Basic program line
**750-810:** fully tokenised TUBE ERROR message, ERR=&60
**960:** start of stand-alone code for fast BGET and BPUT
**970-1080:** send Tube parameters to the BBC micro
**1110-1390:** fast Tube transfer from the second processor to the BBC micro
**1400-1650:** fast Tube transfer from the BBC micro to the second processor
**1660-1970:** CALL extension to allow machine code programs to be started in the BBC micro. It transfers A,X,Y and C across the Tube
**1690-1710:** checks whether the CALL address is destined for the BBC micro (=&FFxxxx)
**2000-2020:** make room for 'TUBE' keyword in the keyword table
**2030-2040:** change the entry address into the keyword table
**2050-2060:** action address of the 'TUBE' keyword
**2070:** allow the 'TUBE' token (&CE) to be recognised
**2090-2130:** insert 'TUBE' keyword, token and attribute into the keyword table
**2150-2180:** make room for 'TUBE' keyword in the keyword table
**2190-2220:** arrange jump for CALL keyword from HiBasic
**2230-2280:** sets new HIMEM
**2320-2390:** PROCsave; checksum and saves machine code. The checksum is correct for HIMEM set to &B800 (default) prior to running the program.

If only the fast BPUT and BGET routines are to be used, lines 250-330, 400-950 and 1660-2270 may be omitted. Then lines 90, 1390 and 2340-2380 must be changed to:

```
90 HIMEM=HIMEM-&73
1390 RTS
2340 FOR X%=HIMEM TO &B7FF
2350 sum%=sum%+?X%
2370 IF sum%<>&48D8 PRINT"Check for possible assembly error"
2380 OSCLI "SAVE M.X_BGET "+STR$~HIMEM+"B800"+STR$~HIMEM
```

The system will still recognise the new *FX 164 calls.

The M.IOTUBE program must be run to set up the BBC micro end of the Tube.

may be more suitable. The fast Tube routines may be extracted from the HiBasic extension by omitting some of the assembly as outlined in the program notes.

There are two programs on the yellow pages to type in which set up the BBC and second processor (2P) at both ends of the Tube (listings 1 and 2). The specific details as to the use of the extensions to the HiBasic are set out in the program notes. There is also a test program, listing 3.

### Additional Basic keyword

The keyword we add to Basic is TUBE, used as follows:

TUBEGET BBC_address, 2P_address, No_of_bytes

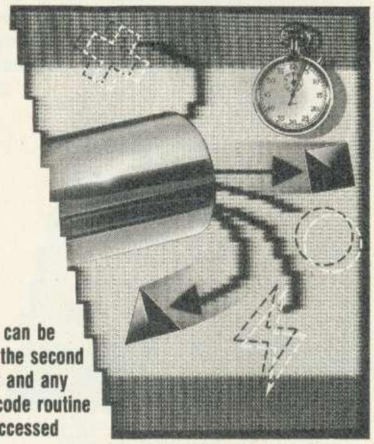
TUBEPUT BBC_address, 2P_address, No_of_bytes

The new Basic keyword TUBE is used to transfer memory contents through the Tube. TUBEGET collects bytes (No_of_bytes) from the BBC (input/output processor) starting at memory position 'BBC_address' and places them in the second processor starting at '2P address'. TUBEPUT collects bytes (No_of_bytes) from the second processor starting at '2P_address' and sends them to the BBC (input/output processor) starting at memory position 'BBC_address'.

The ' TUBE command is tokenised (=&CE), as is the GET in TUBEGET. The minimum abbreviations allowed are TU.G and TU.P (TUBEG and TUBEP are also allowed). The syntax indicated above should be used.

The interpreter expects three numerical parameters after the TUBEGET or TUBEPUT command which must be separated by commas. Real numbers, hexadecimal (prefixed by &) and variables may be used. There must be a space before the first parameter if it is a variable. If the instruction is incorrectly formulated a new error ('TUBE ERROR', ERR = &60) is produced.

A certain amount of care is needed in using these commands as they will corrupt the memory receiving the transferred bytes (&0000 to &2000 in the BBC and &0000 to



**Any ROM can be read into the second processor and any machine code routine in ROM accessed**

&0800 plus HIMEM to &FFFF in the second processor should be avoided).

CALL&FFxxxx is an extension of the normal CALL command. It allows machine code calls to the BBC if the address specified has &FF in its most significant byte of three. The A, X and Y registers and the carry flag are copied from the least significant bytes of A%, X%, Y% and C% and sent across the Tube to a machine code routine (set up by the user) at address &xxxx in the BBC micro. The CALL releases the Tube immediately, and allows both processors to execute independently. As the command USR uses the same code, it will not operate properly if the high address is used here. For example, PRINT USR&FFxxxx returns the registers as entered without change, but does call the BBC program using these registers. Normal USR and CALL operations are unaffected.

### New *FX call

The new *FX call has the following syntax:

*FX164

*FX164,X,Y

where X and Y are numbers. This is used for two purposes. As just *FX164 without parameters (or with any parameters except X = 1) it simply checks whether the appropriate code for these extensions is present at the BBC end of the Tube. If not present, the error 'bad command' (ERR = 254) occurs. If the code is present, no error occurs and &FF is returned in the X and Y registers.

If *FX164 is used with X = 1 (ie, *FX164,1,Y), the ROM in the socket indicated by Y (the ROM position) is selected (eg, *FX164,1,4 selects the ROM in socket 4).

With a ROM extension board up to 16 chips may be selected in this way. This call is mainly employed to select the memory used by the TUBE and CALL extensions.

Thus, any ROM can be read into the second processor and any machine code routine in ROM accessed.

This *FX call is not used by the operating system or DNFS, and is different from that used by the *Graphics* ROM (*FX162) and *Wordwise* ROM (*FX163) by Computer Concepts. The presence of the correct code at the second processor end of the Tube can be simply tested by checking that HIMEM has been changed.

*Turn to yellow pages 106 to 110 for Martin Chaplin's listings*

## LISTING 2 PROGRAM NOTES: TUBE EXTENSIONS: I/O PROCESSOR

This program (listing 2 on the yellow pages) should be run in the 6502 second processor under HiBasic.

The machine code generated is automatically saved, with the correct reload and execution addresses, as X_IOTUBE in directory M. This code only operates with the code generated by the first program (M.X_HIBAS) and may be run as described above. Under no circumstances should M.IOTUBE be *RUN more than once without an intervening hard reset as it changes the OSBYTE vector.

**160-170:** second Tube channel
**180-190:** paged ROM registers
**210:** &60 holds the direction of byte transfer (=0, IO -> 2nd; =&FF, 2nd -> IO; =1, CALL code)
**220:** &61-&62 hold the address in the BBC micro
**230:** &63-&64 hold the number of bytes to be transferred
**240:** OSBYTE vector
**310-390:** set up OSBYTE intercept
**410-440:** check for *FX164,1,ROM_position: code that chooses the ROM to be read
**500:** checks for *FX164 calls
**540-550:** checks to see whether more bytes are coming down the Tube
**560-610:** replace the return address on the stack by the zero page address &36, the address of the DNFS idle routine
**630-690:** recover the remaining Tube parameters
**730-990:** BBC micro end of the fast Tube transfers from the second processor to the BBC micro motherboard: control returns to &36 after RTS
**1000-1260:** BBC micro end of the fast Tube transfer from the BBC micro to the second processor
**1270-1400:** BBC micro end of the CALL extension: control returns to &36 after CALLed code has been executed
**1300-1350:** recovers the carry flag and transfers to the flags register
**1360-1390:** recovers the accumulator
**1450-1520:** PROCsave; checksum and saves the machine code. The checksum is correct for assembly at &1F00, the first free location after the extended character set has claimed its RAM.

If only the fast BPUT and BGET routines are to be used, lines 720 and 1270-1400 may be omitted. The checksum in line 1500 must be changed to &5CA4 for assembly from &1F00. The machine code name in line 1510 should also be changed to M.IOBGET.

# Come to a party at the Barbican in July




See the new Master series.

The fourth Official Acorn User Exhibition will house the largest display of Acorn products and services ever assembled under one roof. If you are already an Acorn owner this is your chance to see, try and buy everything for your computer. If you are about to become an Acorn owner, you can compare prices and specifications before you buy.

## 4th OFFICIAL ACORNUSER Exhibition

**Barbican Centre, Golden Lane, LONDON EC2. 24th-27th July, 1986.**

**Four days of non-stop news, advice, information and bargains.**

## HOW TO GET THERE

*By train:* Holborn Viaduct, Cannon Street, Broad Street, King's Cross, St. Pancras, Liverpool Street.

*By underground:* Barbican, Moorgate, St. Pauls, Bank, Liverpool Street.

## FOR THE HOME USER

All the latest software, low cost peripherals and supplies.

## FOR THE EDUCATIONALIST

All the latest developments: networking, interactive video, second processors and of course the Master series.

## FOR THE BUSINESSMAN

All the latest business packages: new systems, sophisticated software, modems and telecomms products.

## FOR EVERYONE

Advice, competitions and bargains.

## HOURS

Thursday 24th – 10am to 6pm.
Friday 25th – 10am to 8pm.
Saturday 26th – 10am to 6pm.
Sunday 27th – 10am to 4pm.

## COME TO THE PARTY! ORDER YOUR TICKET IN ADVANCE

Buy your ticket now and save money and queuing. There will be special entrances for advance ticket holders. And you could win £500 of Acorn accessories!

*Entrance at the door will be £3 for adults, £2 for under-sixteens.*

Organised by: **Editionscheme Ltd**
HR House, 447 High Road,
Finchley N12 0AF.
Tel: 01-349 4667.
in conjunction with
**Redwood Publishing Ltd**
publishers of Acorn User.

TO: Editionscheme Ltd., HR House, 447 High Road, Finchley N12 0AF.
Please rush me ________(qnty) Adult tickets @ £2 each.
________(qnty) Under-sixteen tickets @ £1 each.
________(10 or more) Bulk tickets @ £1 each.
I enclose cheque/P.O. for £________ payable to Editionscheme Ltd.
Name:________
Address:________
________ Postcode:________

**Acorn products worth £500 to be won.**
Every advance ticket sold automatically enters the prize draw.

# JOIN THE MANDELBROT SET

**You can create amazing graphics using the Mandelbrot set technique – when you enlarge a minute area of a shape, more and more detail will be revealed**

***David Johnson-Davies***

Every so often an abstract mathematical topic captures the imagination of programmers to such an extent that thousands of hours of computer time are expended exploring it. Familiar examples are the search for larger and larger prime numbers in the early days of computers, and in the 1970s the programming of the evolution of cellular automata in John Horton Conway's game, *Life*.

One such topic currently arousing lively interest in computing circles is an object known as the Mandelbrot set.

The Mandelbrot set is an area in the two-dimensional plane defined by the behaviour of a simple function when repeatedly applied to points in the plane.

The whole Mandelbrot set is shown as the black region in the plot of figure 1(a). The coloured bands around the Mandelbrot set represent the behaviour of points as they get close to the set.

The great appeal of the Mandelbrot set lies in the complexity of its shape, which grows when minute parts of the region are enlarged and examined in greater detail. The figures in the two sequences of plots shown in figure 1(b) to (d) and figure 2(a) to (d) were obtained by exploring smaller regions of the Mandelbrot set. Each plot is an enlargement of the entire square area outlined in the previous plot of the same series.

In figure 1(d) a speck to the upper-right of the main Mandelbrot set turns out to be a miniature version of the whole set. In figure 2(d) a symmetrical whirlpool is revealed to have a tiny Mandelbrot set at its centre.

I'll describe the programs the BBC micro used to derive these plots. The Mandelbrot set is named after Benoit B Mandelbrot who has studied it as one example of a class of objects whose appearance remains fragmented or irregular at any magnification. Such objects are known as fractals, and other fractals have already been described in articles in *Acorn User*.

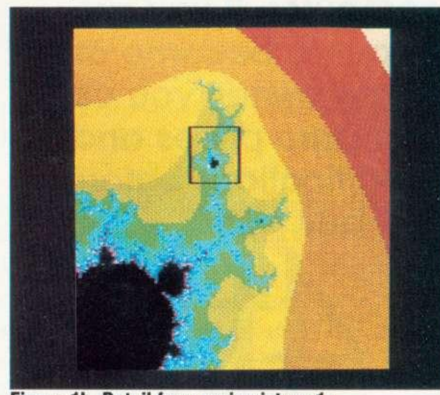


Figure 1b. Detail from main picture 1a

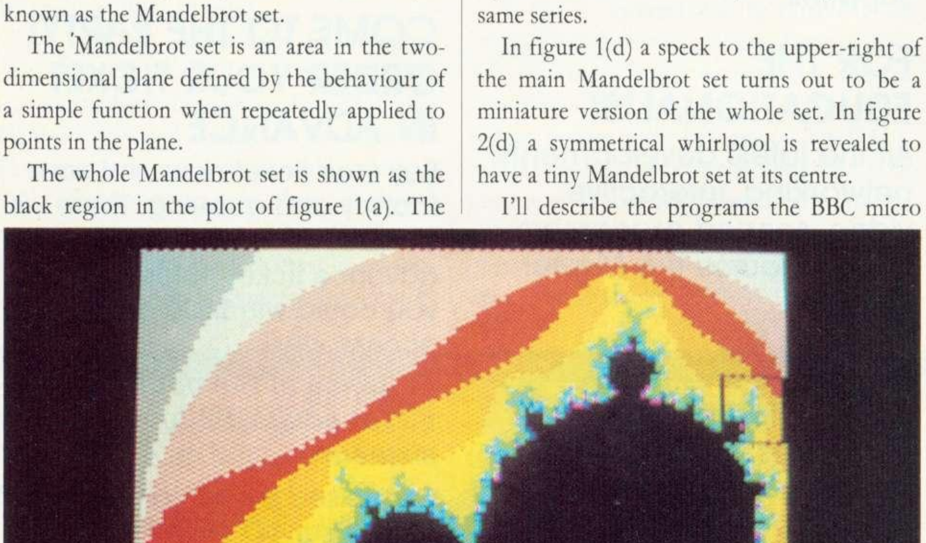


**Figure 1. The Mandelbrot set (a) has infinite detail. If we zoom in on the small boxed area, the result is 1b, and so on . . . These pictures can be generated using the values from table 1 with listing 2**

The mathematical interest in the Mandelbrot set is that complex and unpredictable behaviour results from the repeated application of a relatively simple function; the erratic and turbulent behaviour exhibited by this type of process may prove useful in modelling turbulence in physics.

Before looking at the function which gives rise to the Mandelbrot set, I'll examine a simpler function that behaves in an analogous way in one dimension.

## A turbulent function

The following equations define, for a given starting value u, how the next term in the series should be obtained:

$x_0 = 0$

$x_1 = x - x*x + u$

The function is then repeatedly applied, or iterated, feeding the value of x back into the function to give a new value of x.

The iteration can be expressed by a Basic function FNt(u) as follows:

```
50 DEF FNt(u)
60 N% = -1:x=0
70 REPEAT x=x-x*x+u:N%=N%+1
80 UNTIL N%=255 OR ABS (x)>100
90 =N%
```

The variable N% counts the number of iterations carried out for a given starting value of u. For some values of u the value of the function rapidly becomes very large; because of the $x^2$ term it is clear that as soon as the size of the function ABS (x) exceeds some criterion value, say 100, it will continue to grow without stopping. In such cases we count the number of iterations before this happens, eg, u=2.4 takes seven iterations to exceed the criterion:

2.4, −0.96, 0.5184, 2.6497, −1.9710, −3.4561, −13.0004, −179.6111

and so FNt(2.4) = 7.

However, there is a set of starting values of u for which repeated application of the function never causes x to grow large. I'll call this one-dimensional set the 'T' set. For example, the behaviour for u=2.0 is: 2, 0, 2, 0, 2, 0, 2, . . . etc.

The value of x cycles indefinitely. The behaviour of the function is followed for a convenient number of iterations, in this case 255, and so FNt (2.0) = 255. If this number of iterations is completed without the value of x exceeding the criterion, starting point u is defined as lying within the 'T' set.

The program TURB1 in listing 1 on the yellow pages plots the behaviour of this iterated function FNt(u) over a given range of values of u. It prompts for two numbers – the starting value to be plotted, x, and the range

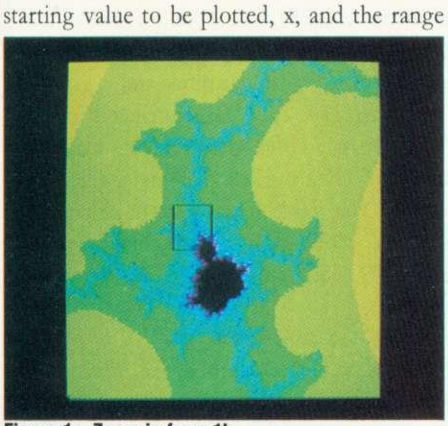


**Figure 1c. Zoom in from 1b**

over which the values should be examined, s. In other words, to plot the range u=2 to u=3 the values x=2 and s=1 should be given. The program divides this range into 256 points and plots the value of FNt on the vertical axis for each of these points.

The result of this plot is shown in figure 3. Values up to approximately u=2.25 belong to the 'T' set. Beyond u=2.25 the behaviour of FNt(u) becomes highly erratic. The number of iterations needed for the function to exceed the criterion value varies wildly from one point to another close to it. The fractal nature of this function will be seen if you try plotting smaller ranges of values within the region of turbulence; for example, between u=2.3 and u=2.300001.

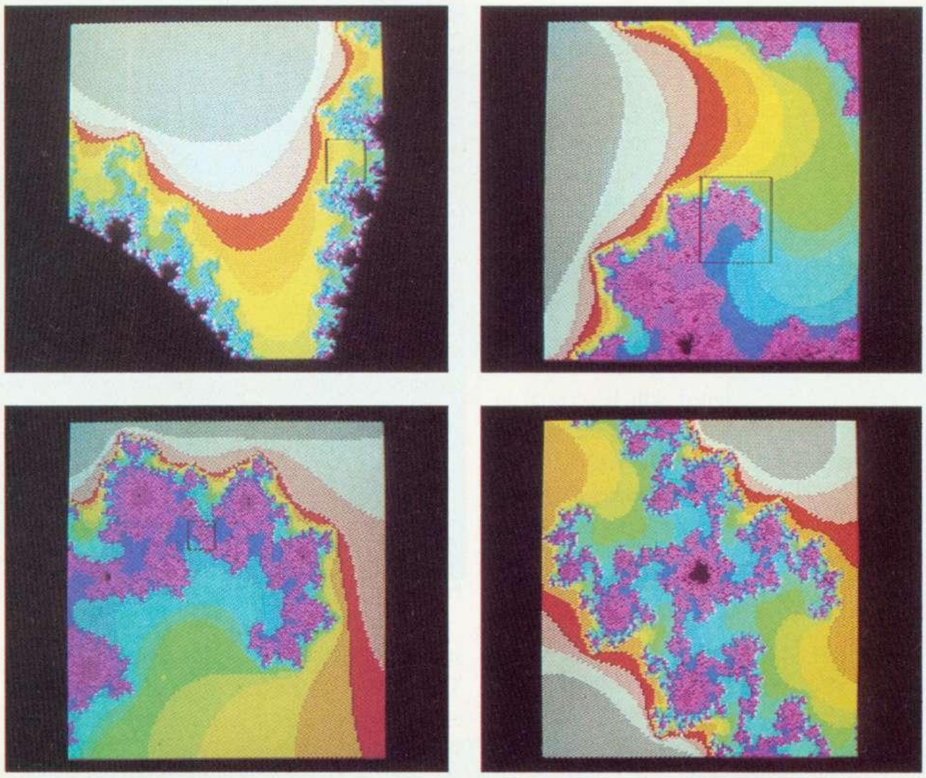


**Figure 2. This sequence is yet another part of figure 1a. The fourth shot has a tiny Mandelbrot set at the centre of the 'whirlpool'. See table 1 for the values to generate these pictures from listing 2**

## The Mandelbrot set

The iteration just described defines a set of points in one dimension. In a similar way, the Mandelbrot set is a set of points in two dimensions defined by a function in x and y when iterated with a given starting value. Stable starting points which when iterated remain small, are said to belong to the Mandelbrot set. Starting points which cause the function to grow rapidly are said to lie outside the set. The function which causes this behaviour is most simply defined in terms of complex numbers. The following description avoids the need for an understanding of com-

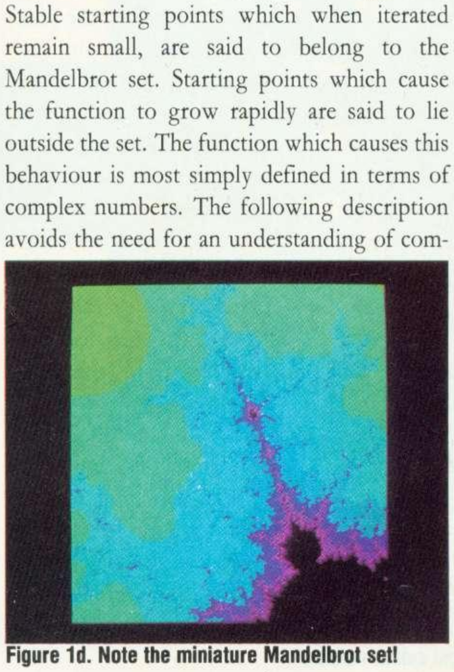


**Figure 1d. Note the miniature Mandelbrot set!**

plex numbers by giving the function in terms of ordinary arithmetic, as it would normally be expressed on a computer.

The Mandelbrot function of a point (u,v) is simply defined by:

$x_0 = 0$

$y_0 = 0$

$x_1 = x*x - y*y + u$

$y_1 = 2*x*y + v$

This can be expressed in Basic as a function FNm (u,v) as follows:

```
60 DEF FNm (u,v)
70 N% = -1:x=0:y=0
80 REPEAT y2=y*y:x2=x*x:
y=2*x*y+v:x=x2-y2+u:N%=N%+1
90 UNTIL N%=255 OR x2+y2>=4
100 =N%
```

This time we use the distance of the point (x,y) from the origin as a measure of the size of the function. It is easily shown that as soon as the distance of (x,y) from the origin exceeds 2, the size of the function will then continue to increase rapidly with successive iterations. The entire Mandelbrot set therefore lies inside the circle defined by:

$x^2 + y^2 = 4$

and we can disregard points outside this circle, coloured grey in figure 1(a). In FNm (u,v) we therefore iterate until:

$x*x + y*y >= 4$

Again, we follow a point for up to 25 iterations. This maximum number of iterations was chosen so that the numbers will fit into one byte when they are to be saved to disc in

MANDEL2. With a higher value the boundary of the Mandelbrot set is slightly sharper, at the expense of longer calculation times.

Points for which FNm(u,v)=255 belong to the Mandelbrot set, and are traditionally coloured black. The equally fascinating behaviour of points outside the Mandelbrot set can be shown by using different colours to represent the number of iterations before FNm(u,v) exceeds the criterion. We have seven remaining colours to assign to the 254 different possible values of FNm(u,v). The way that these colours are assigned will be crucial in determining the amount of detail that can be seen in the area surrounding the set.

There are two possible approaches to assigning these colours. The first is to calculate a fixed mapping of function values to colours,

| | x | y | s |
|---|---|---|---|
| 1a | −2.0 | −1.25 | 2.5 |
| 1b | 0.25 | 0.5 | 0.25 |
| 1c | 0.34 | 0.63 | 0.04 |
| 1d | 0.353 | 0.647 | 0.005 |
| 2a | −0.9 | 0.15 | 0.2 |
| 2b | −0.737 | 0.25 | 0.025 |
| 2c | −0.725 | 0.257 | 0.006 |
| 2d | 0.7228 | 0.26055 | 0.0005 |

**Table 1. The values needed to produce figures 1 and 2**

and then use this mapping for all pictures produced for different parts of the Mandelbrot set. The advantage of this is that in a series of enlargements, such as in figure 1, successive pictures maintain the same colours for the same features in the plots. Also, the display can be built up as the picture is calculated.

The second approach is to calculate the value of the function FNm(u,v) for every point on a particular plot, and then on the basis of the values present in that plot assign the colours to give the desired detail. This approach was used to give the second series of four plots in figure 2 and a program using this method is given towards the end of the article.

## Mandelbrot set program

The program MANDEL1 (listing 2), uses the first approach of assigning colours to points not in the Mandelbrot set to give a series of coloured contours using a fixed mapping function. It plots the points as they are calculated directly in eight colours within a square of resolution 128 x 128. Figure 4(a) to (d) shows a series of screenshots produced using the MANDEL1 listing.

The original program used the Acornsoft *Graphics Extension ROM* to give an additional eight shades consisting of mixtures of successive pairs of the eight standard colours. The version given here can be used to plot either with just eight colours, or with eight colours and eight shades using the *GXR* (or on a Master 128). The version of PROCgcol in lines 620-640 should be used for an eight-colour plot, with maxcol% set to 7 in line 60; for 16 colours the version of PROCgcol on lines 660-710 should be used, with maxcol% set to 15 in line 60. The 16 colour version works by setting D% and E% to the values of adjacent logical colours for odd values of B%, and to the same logical colour for even values of B%. The VDU statement in line 690 then sets up a shading pattern, which the GCOL statement in line 700 selects for plotting.

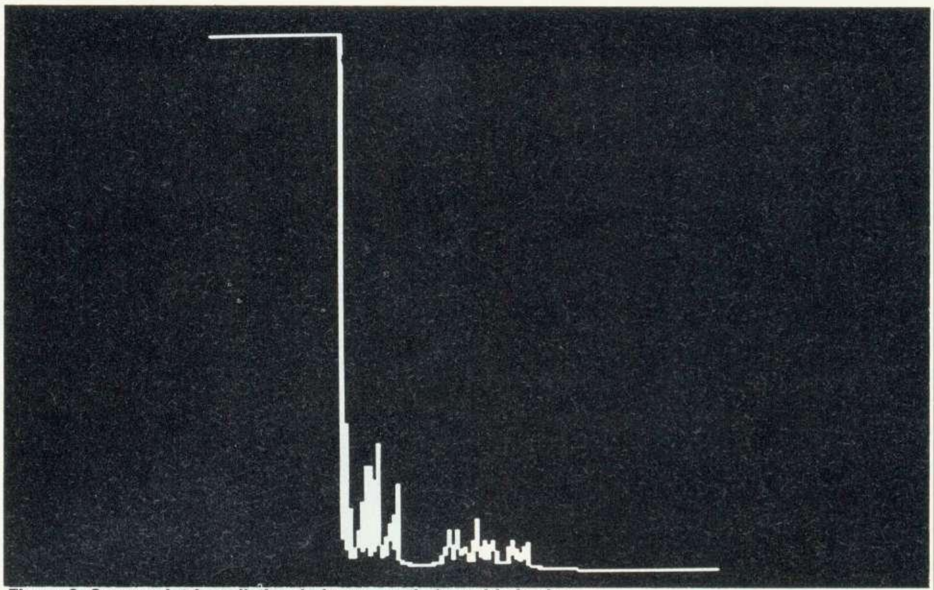


**Figure 3. Screen plot from listing 1 shows erratic fractal behaviour**

The program uses a rather unusual method of plotting the 128 x 128 points on the display so that a coarse lower-resolution view of the whole picture appears quite rapidly, enabling you to check that the desired part of the plot has been correctly chosen. Instead of plotting each of the pixels individually, starting at one corner and scanning the display, it 'tiles' the display, first with one 128 x 128 square, then with four 64 x 64 squares, then with 16 32 x 32 squares, each time filling the square with the colour of the pixel in the lower left-hand corner (lines 560-590). The test on line 530 ensures that each of the 128 x 128 values is actually only calculated once, so that the program takes just marginally longer than plotting individual pixels in strict sequence.

The main program begins on line 60. It first sets up a text window (line 100), and then prompts for the bottom left-hand point of the square to be plotted, x and y co-ordinates, and the length of the side of the square s. The entire Mandelbrot set fits in the square with origin (x,y) = (−2,−1.25) and side s = 2.5. The plots in figures 1 and 2 were made with the values of x, y, and s shown in table 1.

For each point in the 128 x 128 area the program calls PROCpt which calculates the co-ordinates (x,y) of the next point to be plotted and calls FNm for that point. The value returned is then mapped to one of the screen colours by the array C%(1) . . . C%(255) whose elements are set to the values 0 to maxcol% to determine the mapping of function values to colours. PROCgcol is called to choose that colour for subsequent plotting, and a square is plotted at the screen co-ordinates X%,Y%.

The mapping function, found after much experimentation, is logarithmic and is given in lines 130 to 160. The VDU statements in lines 170-220 reassign the physical colours to logical colours 0 to 7 to give a pleasing sequence of colours. The resulting assignment of contour levels to colours is given in table 2, for the eight-colour version.

## Altering the contours

The assignment of colours to the 255 contour levels is a crucial process in achieving a good Mandelbrot plot; if too many levels are assigned the same colour, detail will be lost in the final plot. Conversely, if too many colour changes occur where the contour levels are changing rapidly, the display will be a blur of colour. The most flexible approach to plotting the Mandelbrot set and its associated contours is to save all the calculated points to a disc file; the assignment of the 255 contour levels to the more limited colours on the display can then be handled fairly quickly just by reading the points from the file.

The program MANDEL2 (listing 3) creates

| white | red | yellow | green | cyan | blue | magenta | black |
|---|---|---|---|---|---|---|---|
| 1-2 | 3-4 | 5-10 | 11-23 | 24-52 | 53-115 | 116-254 | 255 |

**Table 2. Alignment of contour levels to colours for the eight colour version**

such a 4k disc file of data; this time, the points are simply calculated in sequence and saved to the file without displaying them. As a measure of the program's progress, the column number J% is printed out for each of the 128 columns.

## Plot data file

The program MANDEL3 (listing 4), reads the data file created by MANDEL2, processes the points, and displays the resulting plot. MANDEL3 first reads in the function values and counts the number of points for each value 0 to 255 in the array C%. It then assigns values to C% such that all function values with a value of 255 are plotted black, and the remaining 15 colours are each assigned to approximately equal numbers of points (lines 200-270). Finally in line 390 the random-access pointer is reset to the beginning of the file, and lines 400-490 plot the entire graphics display.

Again, two versions of PROCgcol are provided, and the appropriate version should be used depending on whether the *GXR* is available, with maxcol% changed to 15 in line 60 as necessary. Because of the large number of calculations needed for each plot, MANDEL1 and MANDEL2 can take between two and four hours to run to completion, depending on the range of values being explored. It is advisable to save a screen-dump of every successful plot for future reference, using for example *SAVE PX FFFF3000 +5000 typed in once the program has finished.

There are countless fascinating shapes waiting to be discovered in the vicinity of the Mandelbrot set; in fact, the infinite detail there makes it certain that there are patterns which will go undiscovered forever. Readers finding particularly interesting regions in the set are encouraged to send them in to *Acorn User*, as screen dumps on disc. A review of the best plots will be featured in a future issue for the benefit of other explorers.

*David Johnson-Davies' listings are on yellow pages 114 to 115.*

*The Mandelbrot set was the topic of the Computer Recreations column by A K Dewdney in the August 1985 issue of* Scientific American. *A fuller account of the function is given in* The Fractal Geometry of Nature *by Benoit B Mandelbrot,* published by *W H Freeman & Co. The concept of iterated functions is discussed in chapter 16 of* Metamagical Themes *by Douglas R Hofstadter, published by Viking.*

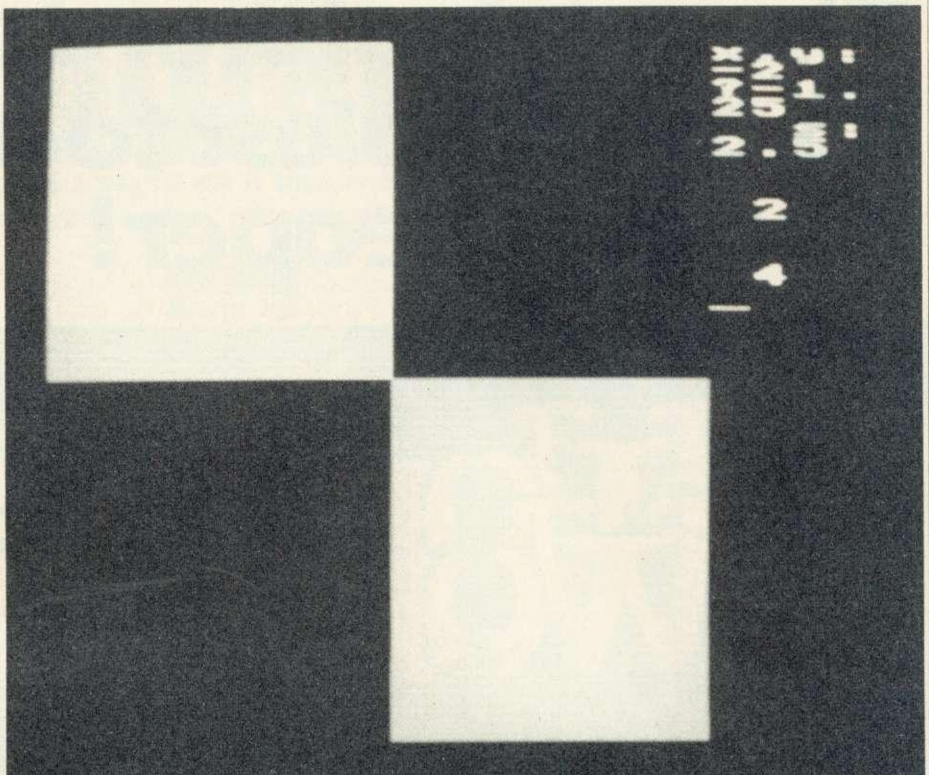


**Figure 4. This sequence of four pictures demonstrates figure 1a being built up by listing 2. Note that the display for the number values is different in listing 2. (a) the start of a three-hour sequence**

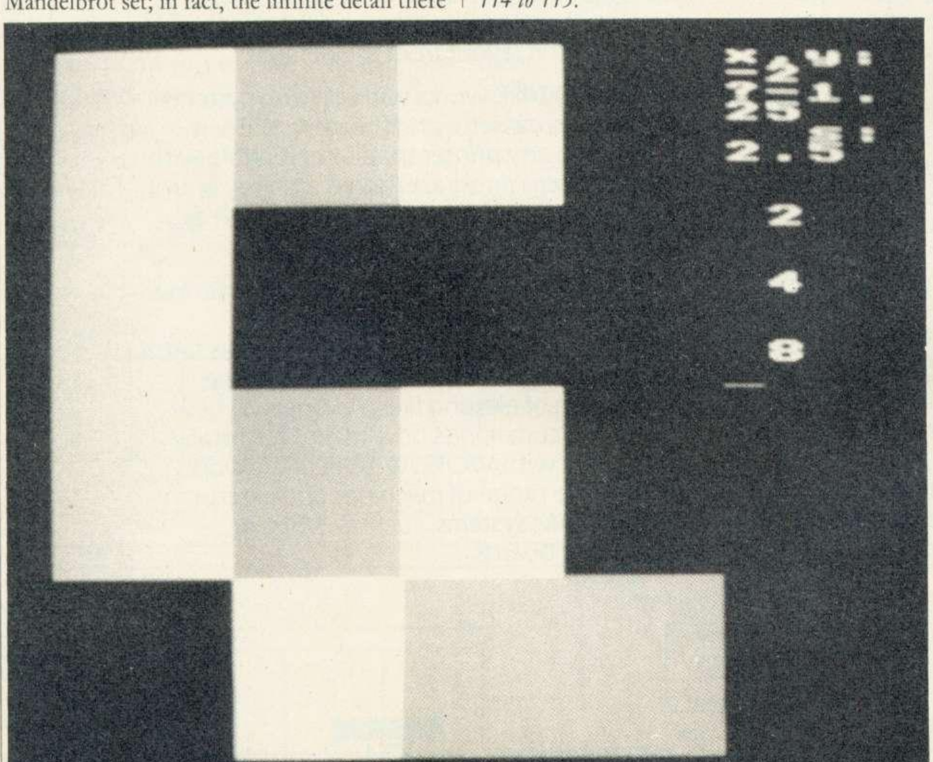


**Figure 4b. After about 30 seconds**

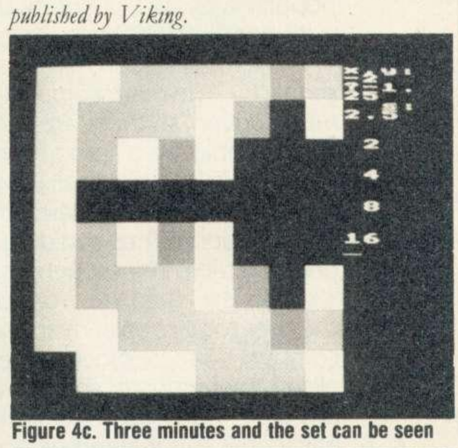


**Figure 4c. Three minutes and the set can be seen**

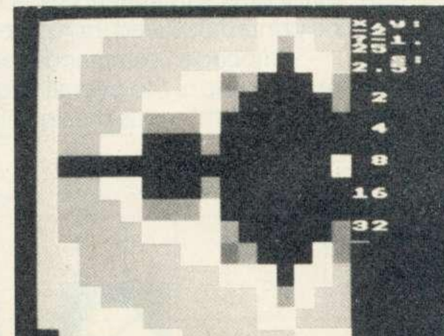


**Figure 4d. Six minutes and detail starts**

# THE CHIPS ARE DOWN

## The original word processor it's the simplest to use and it's now cheaper!

# Wordwise

**The word processor for the BBC micro**

ONLY **£32** + VAT

**ROM MANUAL & TYPING TUTOR CASSETTE**

Since its launch this has become by far the most popular word processor for the BBC Micro, with nearly 60,000 now in use worldwide.

The main reason for this success is its simplicity. The more complex operations are menu driven, so there are no command names to remember. As a result even those unfamiliar with this software can use these features. In addition WORDWISE operates in a smooth and logical manner thus avoiding strange and unpredictable key sequences.

This is a complete word processor giving the user total control over text entered into the computer. Simple block move and copy facilities allow any section of the text to be moved to any other part of a document – fast and efficiently. This marked section of text may also be printed or saved for future use.

Embedded commands can be put into the text to control the overall page layout. These alter such things as the line and page lengths, centering, margins, automatic page numbering and heading and footing lines etc. Embedded commands are only necessary if the user wants to change the layout from the default.

WORDWISE works with all filing systems such as disc, cassette and the new ADFS. It works with any printer that is compatible with the BBC Micro (most are) and is able to control all the special features of the printer such as underlining, italics etc.

This latest version of WORDWISE has now been improved to include some of the WORDWISE PLUS enhancements such as faster loading/saving and protection against the overwriting of existing files. A variety of new embedded commands now make files totally compatible with WORDWISE PLUS. It works with a wide range of machines and extension shadow RAM systems, such as ARIES or WATFORD boards.

Access

Computer Concepts

VISA

Gaddesden Place, Hemel Hempstead, Herts HP2 6EX
Telephone: Hemel Hempstead (0442) 63933

NOW COMPATIBLE
BBC MICRO MODEL B,
B+, B+ 128 & MASTE

# DIY DUMPING

**Our printer expert provides a way for you to transfer user-defined characters to a printer automatically, and a printer dump program for character screens**

***George Hill***

A hint referring to the automatic transfer of user-defined characters on the printer (Nov '85, page 49) provided the motivation for coming up with a mechanism by which this can be done, and you'll find three programs on the yellow pages using the technique. The last of these is a printer dump program for character screens which is similar to the machine-code version of the *Acorn User UserDump* ROM. These listings will work on Epson and Epson-compatible printers with double density graphics facilities such as the Citizen 120d, Star, Kaga Taxan, etc.

The function *CDUMP (character dump) on the *UserDump* ROM decodes the screen version of the characters, whether user defined or not, and produces a perfect printed image, independent of mode. Figure 1 shows an example. Listing 4 gives a sample screen using user-defined characters. It contains the procedure 'PROCreadparameters' which is also used in the dumping program to determine the current mode and set up the line-length and number of lines per page. This enables the program to run in any mode – though user-defined characters have no effect in mode 7.

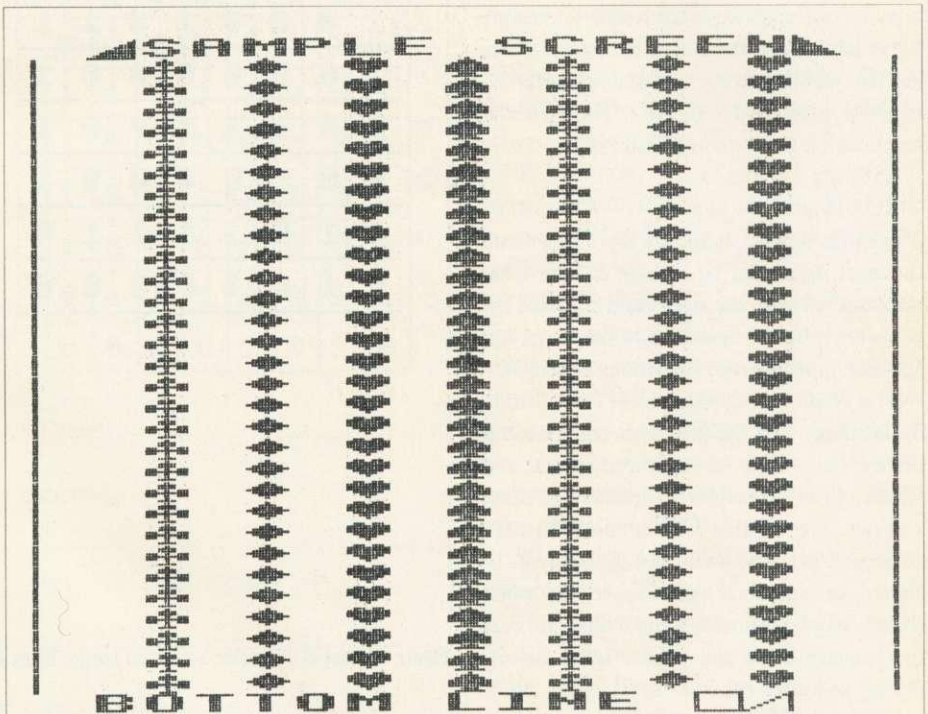



**Figure 1. Example screen in mode 2 dumped using listing 3 from the yellow pages**

The method of dealing with the characters depends on covering the eight 'horizontal' bytes per character of the Beeb's user-defined characters to eight 'vertical' bytes for the printer. This is possible, but unbelievably slow in Basic, and involves MOD and multiplication routines. Bit manipulation is much better accomplished in assembly language.

The machine code for doing this is assembled in DIM space in listings 1 and 3 and has only minor modifications in listing 2 (added routines to read the character at the text cursor and to print the characters after translation).

The programs all place the ASCII value of the current character into a byte reserved for the purpose – 'char'. The routine (assembled at

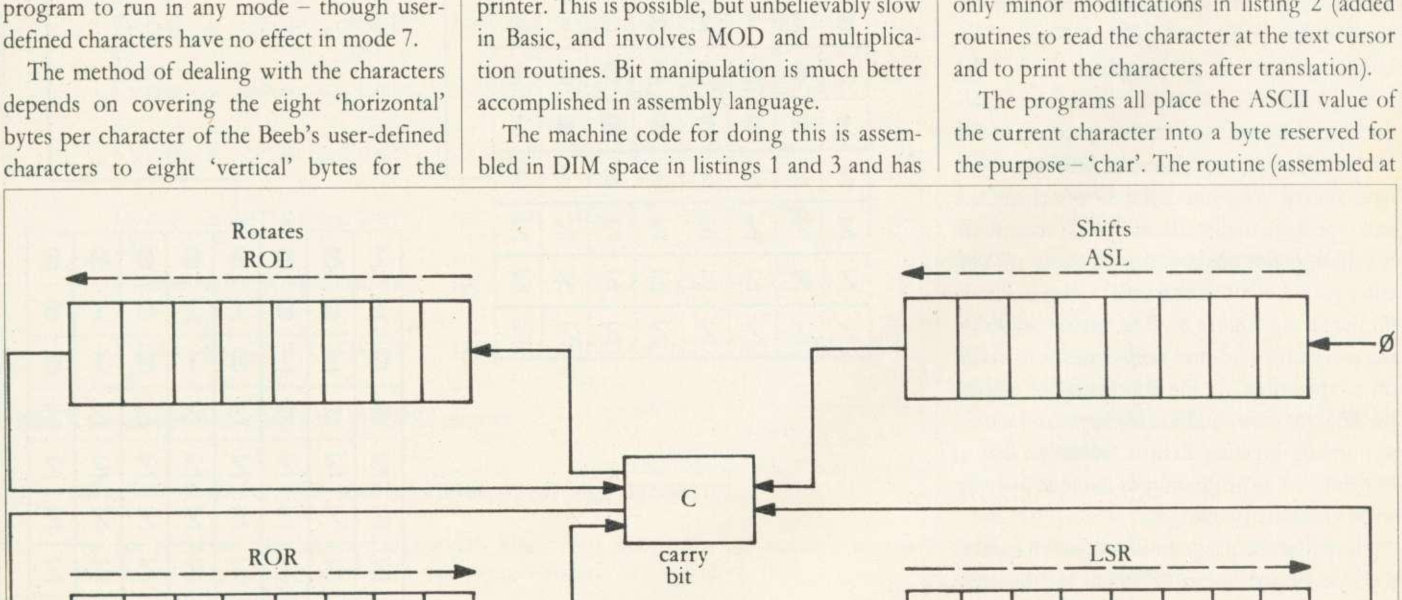



**Figure 2. The 16 possible ways of dealing with bit transfers**

'code') first reads the character definition of this character by an OSWORD call, into eight bytes reserved for it, starting at 'cchar'. These are processed by 'htov' into eight bytes for the printer, starting at 'pchar'.

The processing method depends on the fact that 'shift' and rotate' operations exist on the 6502 which shift bytes either left or right. In all cases the bit shifted out is transferred to the carry bit. In the rotate instructions the previous contents of the carry bit are shifted in, while in the shifts, a zero is shifted in. Thus the carry bit can be used as a temporary home for a bit which is then transferred elsewhere. There are 16 possible ways of dealing with bit transfers, illustrated in figure 2. The particular combination used in this transfer is:

LSR byte 1
ROR byte 2

This shifts the least significant bit of byte 1 into the most significant bit of byte 2. Byte 1 has zeros shifted in to the right-hand end, and the bits shifted out of byte 2 go to the carry, but are 'lost' in subsequent operations (figure 3).

The graphics/text program HTOV (listing 5) illustrates how the bit-by-bit conversion is carried out – it is an animated 'visual aid' which might be helpful to teachers in other contexts. The variable delay at line 160 gives a 10 second delay between moves. This can be altered, or individual moves caused, by using the space bar. Figures 4, 5 and 6 illustrate a set of character bytes and printer bytes before, during and after conversion. They are printouts from the HTOV program.

In listing 1, CHARPRT, single characters are prompted from the screen, either as their ASCII values or as characters, and their defined representations are printed. Figure 7 is a sample output from the program.

In TYPWRTR, listing 2, the printer reproduces exactly any text which is typed at the keyboard, using any character definitions you have altered. You can define Greek characters and type them in directly. If French accents are required, define them and type them in. You enter your text a line at a time, and it is shown on the screen (figure 8). The cursor 'sticks' at the end of the line, and beeps, just as it would on a typewriter. At the conclusion of editing the line (the Copy and Delete keys can be used as normal), pressing Return causes the line to be printed. The program runs in mode 3 giving an 80 character line length.

Note that the program allows *all* characters to be redefined, using *FX20,6, and so must run at &600 above the normal value of PAGE. If the value of PAGE seems too low for the current filing system the program is halted. You can change this by checking lines 240 to 290. If you have discs and the normal DFS

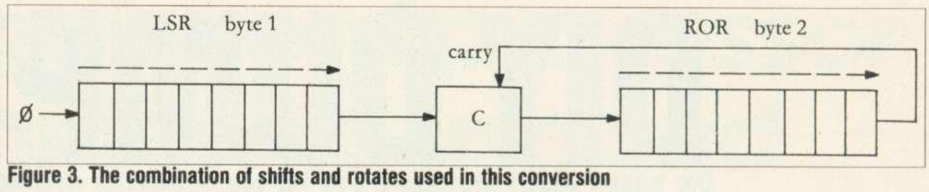



**Figure 3. The combination of shifts and rotates used in this conversion**

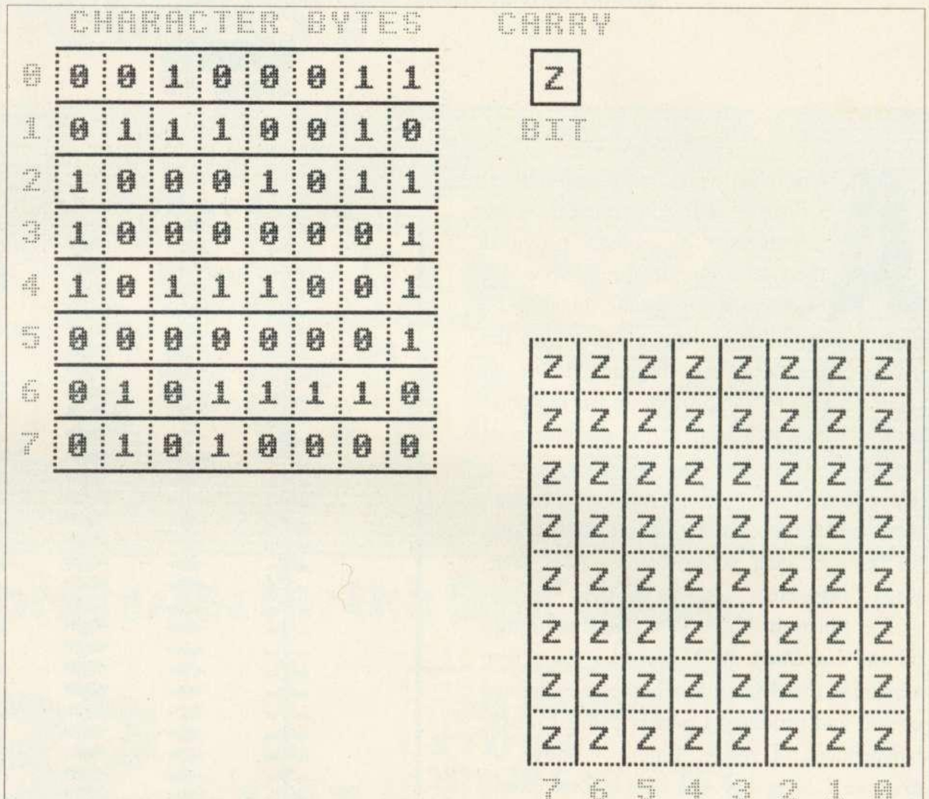



**Figure 4. A set of character bytes and printer bytes before conversion**

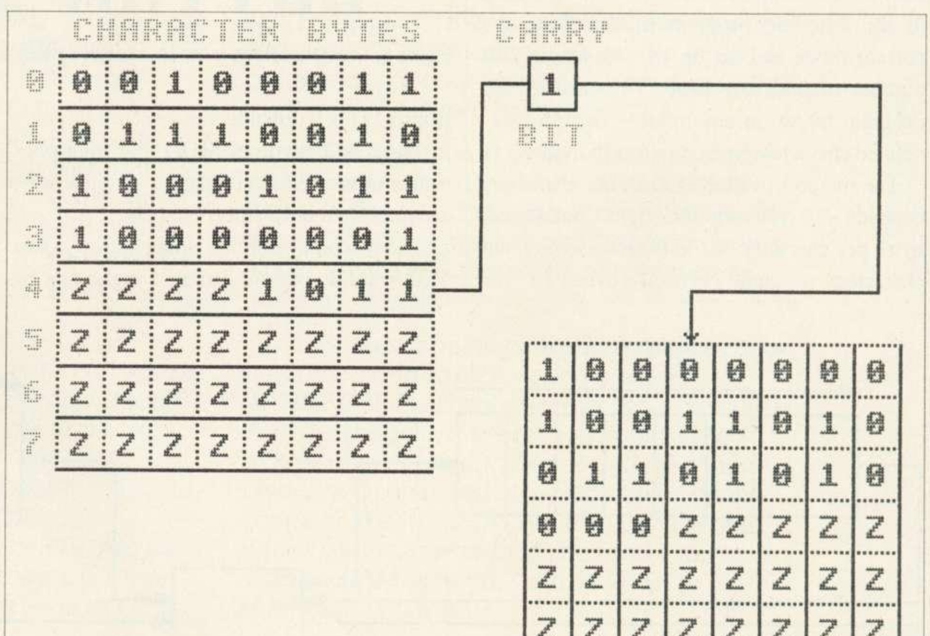



**Figure 5. A set of character bytes and printer bytes during conversion**

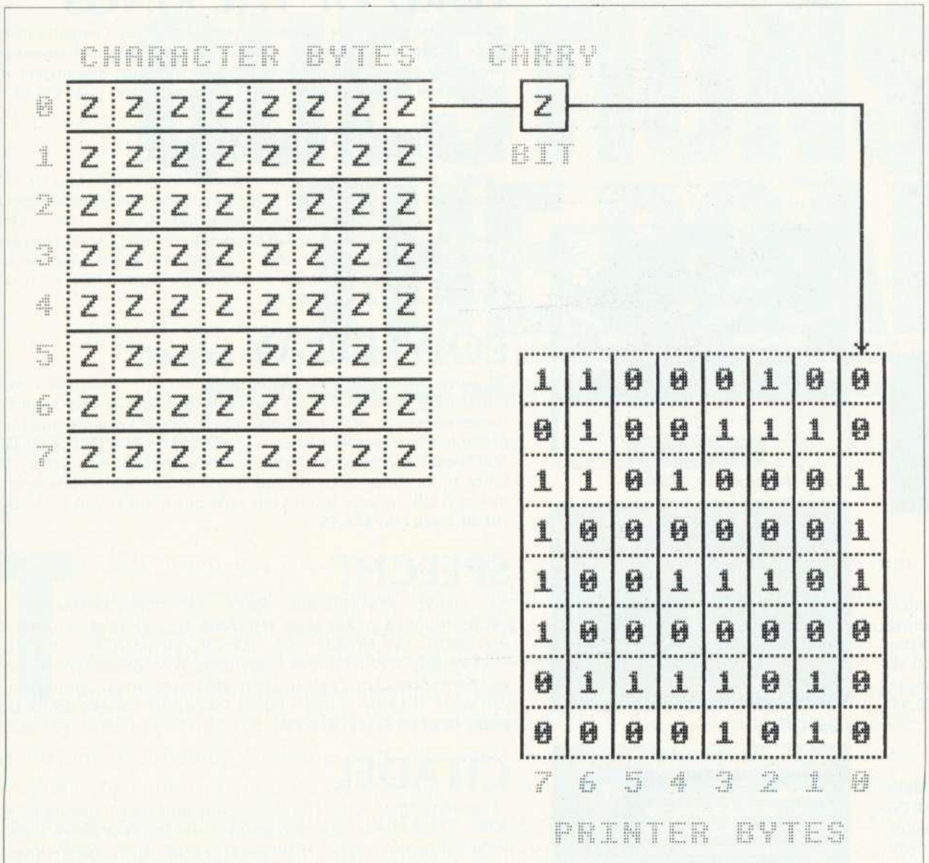



**Figure 6. A set of character bytes and printer bytes after conversion**

```
Type a character, or an ASCII code:A
A
Type a character, or an ASCII code:B
B
Type a character, or an ASCII code:C
C
Type a character, or an ASCII code:1
1
Type a character, or an ASCII code:2
2
Type a character, or an ASCII code:;
;
Type a character, or an ASCII code:*
*
Type a character, or an ASCII code:241
A
Type a character, or an ASCII code:242

Type a character, or an ASCII code:240
```

**Figure 7. Sample output of listing 1, the CHARPRT program**

**THIS PROGRAM ALLOWS YOUR BEEB + PRINTER TO ACT AS A TYPEWRITER.**

**You can redefine characters (notice the A has been altered), and type in a line at a time. They are printed when you press return.**

***If you redefine the characters correctly you can type in foreign characters.***
**I have redefined some of the more obscure ones to use as French characters.**
**Et maintenant je peux écrire en Français!!**
**forêt, sûr, hâte, tôt, à, frère.**

**Figure 8. The TYPWRTR program, listing 2, reproduces text with any character definitions you have altered**

chips, when the default value of PAGE is &1900, then simply prefix the program by:

1 IF PAGE < &1F00 THEN PAGE = &1F00:CHAIN"TYPWRTR"

Your desired character definitions can be carried out either externally by another program, or internally by altering PROCdefinechars (which currently only redefines A of the printing characters). I wanted to use another utility (DEFCHAR) to define the characters. To do this you must remove the *FX20,6 call, as this destroys any previously defined characters in the normal range.

Listing 3, CDUMP, is a procedure for merging with another program (for example the SPLSCRN program). It may then be activated by inserting:

PROCcdump

where you want the dump to occur. You'll find instructions for carrying out program merging in the user guide.

CDUMP will work in any mode, but will *not* print any dots produced by graphics commands or any characters printed at the graphics cursor. PROCreadparameters is used to read information for the printer, as well as characters per line and lines per page. These parameters are used to control the printing of the prepared bytes in PROCdump.

PROCdump (lines 10480 to 10650) is explained line-by-line below:

| | |
|---|---|
| 10490 | Restore default screen and enable printer |
| 10500 | Set linefeed on printer |
| 10510 | Loop for vertical scan |
| 10520 | Set up printer to print correct number of dots |
| 10530 | Read character at text cursor (A% = 135, line 10770) |
| 10540 | Loop for horizontal scan |
| 10550 | Switch dots round |
| 10560 | Loop to print eight bytes |
| 10570 | Print one byte |
| 10580 | Double up if mode 2 or 5 |
| 10590 | NEXT I% |
| 10600 | Disable printer, advance text cursor and enable printer |
| 10610 | NEXT X% |
| 10620 | Linefeed |
| 10630 | NEXT Y% |
| 10640 | Formfeed, reset printer and disable printer |

The conversion of CDUMP to a full machine code program to dump the graphics screen is largely a matter of doing arithmetic in assembly language and adding a print routine. This is relatively simple if you are into that sort of thing. If not, buy the very reasonably priced *UserDump* ROM!

*George Hill's listings to dump user-defined characters are on yellow pages 110 to 114*

VISA
ACCESS

# SPEEDYSOFT

01-846 9353 (24 HRS)

EUROCARD
MASTERCARD

**WE ALWAYS TRY TO SEND YOUR PROGRAMS ON THE SAME DAY WE GET YOUR ORDER, THAT'S WHY IT'S CALLED SPEEDYSOFT! All programs normally in stock before we advertise them! FOREIGN ORDERS WELCOME, satisfied customers in 64 countries over 3 years. UK prices include VAT: export prices are the same, plus p&p because of the extra work involved. Pay by sterling cheque, bank draft or postal order. All orders must be prepaid: we send your programs as soon as we get your money!. It's fastest to order by phone from any country with your VISA, EUROCARD, MASTERCARD or ACCESS. Call 01-846 9353, 24 hrs, 7 days a week. BIG FREE ILLUSTRATED CATALOGUE WITH EVERY ORDER WITH DETAILED REVIEWS, SCREEN SHOTS, ETC. Includes lots of classic serious software, too. Send £1.00 cash (refunded with first order) for catalogue only.**

"SUPERB SERVICE – KEEP UP THE GOOD WORK"
(T. Clifton, St. Neots)

## SPEED CONTROLLER

This add-on will control the speed of all keyboard and joystick operated programs. FREEZE frame and variable speed from normal to almost freeze. Plugs in to the Tube port. If you want to use the Tube for something else at the same time, order the Extension as well. Useful for debugging programs as well as playing games! (Nidd Valley) **SPEED CONTROLLER £14.95 TUBE EXTENSION £8.95**

## MINI OFFICE 2

Enhanced version of the famous suite of programs. **WORD PROCESSOR: SPREADSHEET: DATABASE: CHARTS: COMMUNICATIONS: LABEL PRINTER** All on one disk. All modules 6502 and AMX Mouse compatible. Original 'Mini Office' files will load, too. 60-page ring-bound manual. Staggering value-for-money. (Database) **Cassette £14.95 Disk (State 40 or 80 Track) £16.95**

## FLEET STREET EDITOR

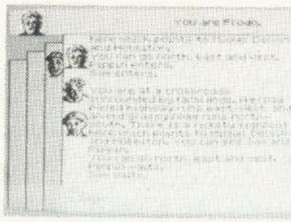
**"The supplied graphics, the ease with which layouts can be put together and the ease with which effects can be applied to text mean that this is an all-round success ... an invaluable release for print-minded BBC users."** (A&B Computing 03/86) **"If you have the proper combination of imagination and a little business sense, the package certainly offers a way of making money with your computer. It certainly makes the most of the BBC micro."** (Your Computer 03/86)(Mirrorsoft) BBC B and B+. 2 Disks: no cassette: (State 40 or 80 Track) £39.95

## REPLAY ROM

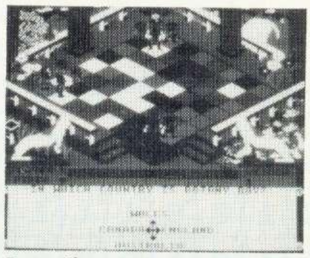
*"A magical piece of equipment ... very useful if you can only buy the tape version of a program ... highly recommended."* (A&B Computing 12/85) Transfer any program, just about, from tape to disk. State disk system clearly when ordering. (Vine) **REPLAY ROM £35.00**

## STUDIO 8

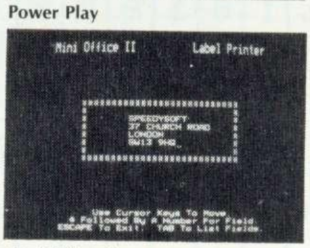
This program contains over 20K of machine-code to convert your Beeb into a 4-voice synthesizer with an 8-track digital recorder with rhythm and drum machine. Comes with 4 music demos. Select any of 32 instruments by name and compose music. (Beebugsoft) **Cassette £17.00 Disk (40/80 Track OK) £22.00**



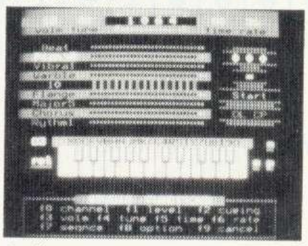
Lord of the Rings



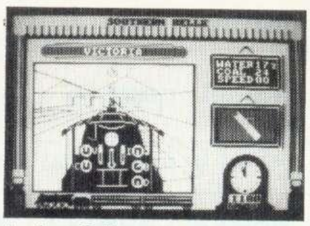
Power Play



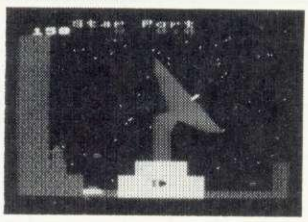

Mini Office II



Studio 8



Southern Belle



Citadel

## LORD OF THE RINGS

**"Sets new standards for cassette adventures."** (Your Computer 02/86) **"One of the most advanced, original and involving text adventures you'll ever play ... without peer in terms of scope, imagination and involvement."** (Melbourne House) 2 Cassettes (no disk) £15.95

## SOUTHERN BELLE

*"Steam train fanatics and simulation freaks will love it. The atmosphere is terrific (smell that smoke) and the options mean its got lots of lasting interest."* (Amstrad Action 11/85) *"Once mastered, it's brilliant. The job becomes very exciting and involved when attempting speed runs ... there's a great deal of skill involved and hardly any luck, a must for simulation lovers."* (Crash 11/85) (Hewson) **Cassette £7.95**

## POWERPLAY

*"A game brimming over with originality ... Powerplay's most outstanding features are its high-quality graphics and sound ... comes with over 2000 questions, which should keep the most avid player hooked for some time ... AN OUTSTANDING PIECE OF BBC SOFTWARE."* (Personal Computer World 02/86) Powerplay, the Game of the Gods, is by Arcana. 4 skill levels. Acorn Speech Chip makes it talk to you. Input your own questions if you wish. **Disk (40/80 Track OK) £14.95**

## SPEECH!

*"A QUITE REMARKABLE PIECE OF PROGRAMMING ... INCREDIBLY EASY TO USE. THE END RESULT IS AS GOOD AS ANYTHING I'VE HEARD THIS SIDE OF THE AMIGA ... A REALLY SUPERB RELEASE."* (Popular Computing Weekly)Just type in 'SAY' and then some plain English. Then add pause, stress, intonation as you wish. It really is that simple! (Superior) **Cassette £9.95 Disk (State 40 or 80 Track) £11.95**

## CITADEL

*"Everything that 'CASTLE QUEST' was and more and more and more. This game is extremely good ... the graphics are very good. Well worth the cash. "* (Computer Gamer 01/86) *"Everyone can enjoy Citadel the adventure and will feel the compulsive urge to master this game."* (A&B Computing 02/86) Over 100 screens. Sticks OK. No good with Solidisk DFS 2.0. (Superior) **Cassette £9.95 Disk (State 40 or 80 Track) £11.95**

"QUITE SIMPLY, YOU'RE THE BEST"
(S. Andrews, Portsmouth)

## HARRIER

*"This game has almost everything. It is a combination of flight simulator, shoot em and strategy games ... this will not convert you if you don't like flight simulations, but if you do, buy it."* (Micro User 02/86) *"A classy, polished and highly addictive simulation, this is a game to keep."* (Computer & Video Games 02/86) Choose either Practice or Combat with 3 skill levels. 30 command keys. 28-page manual. No Stick. (Mirrorsoft) **Cassette £9.95 Disk (40/80 Track OK) £12.95**

## WORD/FONT/SPELL WISE!

You can't beat the **WORDWISE+ ROM.** Compatible with 6502 2nd processor. Our price £50.00 saves you £6.35. **FONTWISE** from Clares gives you 10 new type faces to choose from, either normal or condensed. Not 6502 compatible. Disk (State 40 or 80 Track) only £12.00. **SPELLCHECK 3 ROM** from Beebugsoft. A Rom and a dictionary disk with 6,000 words check your spelling. Add words to the disk as you wish. 6502 compatible. State 40 or 80 Track. Our price £34.00 saves you £2.00.

IF YOU DO NOT WISH TO CUT THIS MAGAZINE, PLEASE WRITE YOUR ORDER OUT CAREFULLY ON PLAIN PAPER AND QUOTE REFERENCE 'ACU14.'

**POST TO: SPEEDYSOFT (ACU14)**
**37 CHURCH ROAD, LONDON SW13 9HQ, ENGLAND.**
For CATALOGUE ONLY, send £1 cash. Refunded with your first order.
My computer is .............................. I enclose a cheque/PO payable to Speedysoft OR charge my VISA/ACCESS/EUROCARD/MASTERCARD

No. ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

Signature: .............................. Expiry Date ..............................
Please write clearly. If we can't read it, you won't get it.
Name: ..............................
Address: ..............................
..............................
.............................. Postcode: ..............................
PHONE NO: if any, in case of query ..............................

| Program Name | Cass/Disk | Price |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| Postage & Packing | UK add 1.00p per order | |
| | Europe ADD £1.50 per program | |
| | Outside Europe ADD £2.00 per program | |
| | Total Order | |

5-86

# QUESTIONS FOR THE BOARD

**Choosing an expansion board to extend the capacity of your BBC micro or Electron is not easy. Here we answer your most common questions and summarise what the options are**

***Chris Drage***

The BBC micro was not designed to accommodate extra boards despite being able to cope with 16 paged ROMs. Physically a 12-socket board takes up a great deal of space inside the machine, and any board covering the Beeb's RAM area is inviting overheating problems with the resulting corruption of memory. Picking up the lines necessary for operation can provide some soldering headaches, although many boards are now of a plug-in-and-go design. Perhaps the main factors to consider when choosing a ROM expansion board are:

- Ease of installation
- Reliability in operation
- Physical stability of the board
- Offers sideways RAM
- Compatibility with future expansion plans

The reviews which appeared in the April and September 1985 issues deal with most of these points.

## Options

For the maximum number of ROMs, the Exprom, ATPL and Watford SSRB boards provide for 16 paged ROMs. I have extensively used both the ATPL and the Exprom boards and found them easy to install and reliable. Another system worth considering is the Computer Village CVX16-2, but this one's awkward to fit. If you wish to use sideways RAM to the full, then the Ramamp RA32 board scores well. Utilising 32k of dynamic RAM it represents a cost-effective means of combining sideways RAM and ROM expansions, but the number of ROM slots available is limited to 10. The Aries B12 is another well-constructed board. Its ease of installation and reliability, combined with the fact that it may be used with the Aries B32 shadow RAM board, makes it an attractive option.

Several manufacturers have opted for externally mounted boards. Perhaps the most cost-effective and simple ROM expansion system is the excellent ROM-cartridge system from Viglen Computers (reviewed in *AU* October 1984), which enables you to utilise an unlimited number of ROMs safely, although if you have 30 ROMs it might be more expensive than a ROM board. I do not recommend the use of externally mounted ZIF sockets as the risk to valuable ROMs is too great. Other larger, external boards are produced by GCC (Cambridge) and HCR Electronic Services. If you want the best of external ROM sideways RAM expansion then both these systems are sure to please. Provided you have additional driver boards installed, each has the added bonus of being portable. The Micro Pulse Rombox is an elegant but expensive way to expand one ROM socket. With the purchase of additional leads, this system is also portable.

All the ROM expansion options above provide various solutions to the BBC micro's lack of ROM sockets. You will have to judge for yourself whether you are likely to make sufficient use of the facilities each offers to justify the cost.

## The system for you

Many people expand the sideways RAM potential of their computers in preference to obtaining extra ROMs, and again we are spoilt for choice. I'll offer a few pointers and include the summary and score tables carried in December. Any changes to the figures are the result of hardware improvements, updated software (in Solidisk's case), and price changes. In addition, I've included several questions which are typical of those *Acorn User* receives on the subject of sideways RAM.

**Q** I am a novice. I simply want to add 16k of sideways RAM to my machine.

**A** Of the boards reviewed the Ramamp RA16 offers reliability and the best value for money. Easy to fit, but more expensive, is *Acorn User*'s own UserRAM.

**Q** What is battery backup?

**A** Many ROM boards provide a facility for you to add a small Ni-Cad battery at a later date. This is charged by the computer and provides a means for sideways RAM to maintain its current ROM image while the computer is switched off. This is particularly useful for those who are developing their own sideways software. The reviews in the April and September 1985 issues refer to the boards which provide battery backup.

**Q** What is write protection?

**A** Several RAM boards provide the facility of a write protect switch (or allow you to add one). Once invoked, the switch prevents any writing to sideways RAM by the user or by the ROM image.

| RAM Boards | Solidisk 32/64/128 | HCR 16/32 | Ramamp RA16 | Acorn User User RAM | Watford 16k Module |
|---|---|---|---|---|---|
| Design | 3 | 4 | 4 | 4 | 2 |
| Construction | 3 | 5 | 4 | 4 | 4 |
| Ease of installation | 1 | 4 | 4 | 5 | 3 |
| Versatility | 5 | 4 | 4 | 4 | 4 |
| Software provided | 4 | 3 | 4 | 4 | 3 |
| Documentation | 4 | 3 | 3 | 4 | 3 |
| Value for money | 4 | 4 | 4 | 3 | 3 |
| Total (out of 35) | 24 | 27 | 27 | 28 | 22 |

Key: 5 *Excellent*, 4 *Good*, 3 *Satisfactory*, 2 *Poor*, 1 *Very bad*

**How the internal RAM boards score out of 35**

# COMPATIBILITY

### Internal RAM/ROM boards

| | RAM or ROM | Total ROMs available | RAM available | Installation | Cost | Software provided | Available from |
|---|---|---|---|---|---|---|---|
| ATPL | RAM/ROM | 14 (socket 15 reserved for RAM) | 16k as 2 × 8k CMOS (6264) static RAMs. Battery backup option | Plug in | £38 + VAT (Battery backup kits £17 + VAT) | N/A | ATPL, Station Road, Clowne, Chesterfield S43 4AB |
| Aries B12 | RAM/ROM | 12 (socket 0 reserved for RAM) | 16k as 2 × 8k CMOS (6264) static RAMs or 8k as 1 × 8k CMOS RAM chip | Plug in (can be mounted externally (CPU carrier board £5.75 extra) | £40 + VAT | N/A | Aries Computers, Science Park, Milton Road, Cambridge CB4 4BH |
| Ramamp RA32 | RAM/ROM | 10 | 16k or 32k dynamic RAM on board | Plug in + 4 wires to solder | £59 | 10 utilities | Twillstar Computers, 17 Regina Road, Southall, Middlesex |
| Exprom | RAM/ROM | 16 or 15 + 1 RAM position. Wait states may be selected for slow EPROMs | 2k, 4k, 8k, 16k options (able to be mixed with EPROMs) | Plug in (may be mounted externally) | £59.95 (basic) £80.50 (fully expanded) | N/A | Anderson Electronics, 2 Hollin Park Road, Calverley, Pudsey LS28 5PU |
| Watford solderless ROM board | RAM/ROM | 16 | 16k as 2 × 8k CMOS (6264) static RAMs. Battery backup option | Plug in | £32 + VAT (Battery backup £38 + VAT) | N/A | Watford Electronics, Jessa House, 250 Lower High Street, Watford, Herts |

### External ROM sockets

| | RAM or ROM | Total ROMs available | RAM available | Installation | Cost | Software provided | Available from |
|---|---|---|---|---|---|---|---|
| Viglen | Cartridge | N/A | N/A | Plug in | £15.95 Cartridges £2.95 each | N/A | Viglen Computer Supplies, Unit 7, Trumpers Way, London W7 2QA |

### External ROM/RAM boards

| | RAM or ROM | Total ROMs available | RAM available | Installation | Cost | Software provided | Available from |
|---|---|---|---|---|---|---|---|
| Micro Pulse Rombox | ROM | 8 (1 is a ZIF socket) | None | Plug in | £57.44 | N/A | Northern Computers, Churchfield Rd, Frodsham, Cheshire WA6 6RD |
| External ROM box | RAM/ROM board including own PSU | 12 + 12 on optional second card | 32k possible as 4 × 8k CMOS (6264) static RAMs. Also 6116,2016 RAM chips | Plug in | £80.50 (£33.35 for second card) | N/A | HCR Electronic Services, HCR House, Bakers Lane, Ingatestone, Chelmsford, CM40 B2 |
| Ram/Rom 15 | RAM/ROM | 11 or 10 + 1 RAM position (plus 4 on BBC board) | 2k, 4k, 8k, 16k options + rechargeable battery backup and several configurations (separate power supply available) | Plug in driver board (main board external) | £100.79 | 6 utility programs | GCC (Cambridge), 66 High Street, Sawston, Cambridge CB2 4BG |

### Internal RAM boards

| | RAM option | RAM position(s) | RAM write protect | Installation | Cost | Software provided | Available from |
|---|---|---|---|---|---|---|---|
| SWR 32<br>SWR 64<br>SWR 128 | 32k<br>64k<br>128k | 15, 14<br>15, 14, 13, 12<br>15, 14, 13, 12, 11, 10, 9, 8 | No<br>No<br>No | Bared wires to push in (or solder) to legs of chips | £53<br>£80<br>£125 | 5 discs<br>5 discs<br>5 discs | Solidisk Technology, 17 Sweyne Avenue, Southend-on-Sea, Essex SS2 6JQ |
| HCR 16<br>HCR 32 | 16k<br>32k | 15 to 12<br>15 to 12 | Yes<br>Yes | Plug in<br>Plug in | £36.22<br>£47.72 | 2 utilities | HCR Electronic Services (as before) |
| RAM 16 | 16k | 15 to 12 | Optional | Plug in | £32 | 8 utilities | Ramamp Computers, 25 Avon Drive, Whetstone, Leicester |
| UserRAM | 16k | 12, 13 | No | Plug in | Pack 1 £38.50<br>Pack 2 £57.95 | 10 utilities<br>27 utilities + book | Redwood Publishing, 141-143 Drury Lane, London WC2B 5TF |
| Watford 16k module | 16k | Any | Yes + read protect | Plug in | £33.35 | 3 utilities | Watford Electronics (as before) |

**Summary of what the expansion boards have to offer, how much they cost and where to get them**

**Q** Can I run any program in sideways RAM?

**A** No. Generally speaking only machine code programs written to load at &8000 to &BFFF can run from sideways RAM unless you wish to store programs in ROM filing system format. Looking at your disc contents (using *INFO.*.*), sideways ROM images normally appear as either:

progname 008000 008000 004000 (16k)
or progname 008000 008000 002000 (8k)

**Q** Can I use the ROM Filing System?

**A** Yes, you can. One of the best packages I know of that enables you to convert your favourite software to run from sideways RAM is Beebugsoft's *Romit*. This package creates a ROM image of the program from which you can blow an EPROM. It works by downloading the program to its correct execution address in the main RAM and running it. Also, the disc supplied with UserRAM contains a ROM filing system formatter which will take standard Basic program files and format them, enabling them to be loaded into sideways RAM and subsequently loaded as required. A similar program can also be found in Bruce Smith's *The BBC Micro ROM Book* (published by Collins at £9.95).

**Q** Please tell me, how do you load software into sideways RAM?

**A** Most RAM board manufacturers provide information about how to do this. Typically the command: *LOAD ROMimage 8000 <RETURN> followed by either CALL!−4 (or pressing Break), will initialise a ROM image. The B+128 and Master use a unique command : *SRLOAD ROMimage 8000 W Q. Several suppliers such as Solidisk, Ramamp and HCR provide elegant menu programs to do this automatically for you.

**Q** I am an experienced programmer who wishes to develop my own ROM-based software in sideways RAM.

**A** The *Acorn User* UserRAM module has a very substantial range of software to support it and would be an ideal tool for this purpose.

**Q** I want to utilise 32k of sideways RAM so I can load two ROM images.

**A** The HCR Electronics 32k board is a reliable and well-designed board. The Solidisk 32k board can also be recommended if you are competent with a soldering iron.

**Q** I am in charge of a network of BBC micros in an educational institution. Should I purchase RAM expansion boards for each network station?

**A** Using sideways RAM is a cost-effective means of distributing ROM-based software. UserRAM, Ramamp RA16 and HCR 16/32k units can all be recommended. Most software publishers are now prepared to grant software licences for network users.

**Q** I have an ATPL Sidewise ROM board and want to add another 16k of sideways RAM to that already present.

**A** The only system I know that offers such expansion is the RAM module produced by C F Terrell, 7B Essex Gardens, Hornchurch, Essex RM11 3EH. Tel: (04024) 71426. Alternatively, the Aries B32 is now compatible with the Sidewise board.

**Q** I am a hobbyist who wants to use sideways RAM to the full.

**A** The Solidisk 64k system is probably the most versatile unit available at present. The new, updated software allows you to configure the RAM in a number of useful ways. You must be prepared for some headaches should you install it yourself, though!

**Q** I own an Electron. Can I upgrade it with any sideways RAM board?

**A** The only system available at the moment is the Advanced Computer Products RAM expansion system at £29.90 from 6 Ava House, High Street, Chobham GU24 8LZ. The Solidisk EFS disc interface is also supplied with 16k of sideways RAM. Both systems require a Plus 1 to be fitted to the Electron.

**Q** I want to upgrade my BBC model B to include shadow RAM, sideways RAM and sideways ROM expansions. Which units should I choose?

**A** For reasons of compatibility it is best to stick with one manufacturer's product. In this case the best solution would be to install the Aries B32, B12 and two 6264 CMOS RAM chips. Look out for reviews of the new 256k RAM expansion system from Solidisk, which may also provide the answer.

**Q** I own a Viglen Cartridge ROM system. Is there any value to be gained in installing a sideways RAM board?

**A** Sideways RAM can be configured into DFS workspace or a printer buffer, both of which are advantageous. The Ramamp RA16 and Solidisk systems offer software to achieve this.

**Q** I have heard that sideways RAM can be configured into a 'silicon disc'. What is this and how useful is it?

**A** The Solidisk 64k and 128k boards can be configured into a silicon disc. The computer thinks that another disc drive has been fitted, thus DFS commands will work with the sideways RAM. The RAM-disc is volatile, so if you turn the computer off the RAM-disc is lost. It is useful for spelling checking and database work as the speed of access is about 10 times faster than any conventional disc drive.

**Q** I use a Solidisk 32k sideways RAM system but I want to expand my Beeb's ROM capacity. Can I do this without compatibility problems?

**A** There is only one reliable way that I know, and that is to add a Ramamp ROM6S card. This will give you an extra six ROM slots with the 32k and 64k boards.

**Q** Is UserRAM compatible with any of the popular sideways ROM expansion boards?

**A** The only boards I have actually had UserRAM running properly with are the Watford MKII board and the HCR internal board. Maybe readers have found other combinations I have not been able to test yet.

The final answer prompts me to request readers to help us assemble a table of RAM/ROM compatible expansion boards. The only true test of compatibility of specific products is reliability in general – everyday use over a long period of time. If you have used any ROM board/RAM board combinations successfully we would love to hear from you.

*Turn to page 96 for details of how you can join our ROM Compatibility Quest*

| Expansion Board | Ramrom 15 | Exprom | Aries B12 | Ramamp RA32 | ATPL Sidewise | Watford SSRB | Micro Pulse Rombox | HCR External | Viglen Cartridge |
|---|---|---|---|---|---|---|---|---|---|
| Design | 5 | 5 | 4 | 4 | 4 | 2 | 5 | 5 | 5 |
| Construction | 5 | 5 | 5 | 4 | 4 | 4 | 5 | 5 | 5 |
| Ease of installation | 5 | 4 | 4 | 4 | 3 | 3 | 5 | 5 | 5 |
| Ease of chip removal/insertion | 3 | 3 | 4 | 3 | 3 | 3 | 5 | 3 | 5 |
| Versatility | 4 | 5 | 4 | 5 | 3 | 4 | 3 | 5 | 3 |
| Documentation | 5 | 5 | 5 | 3 | 4 | 3 | 3 | 3 | 3 |
| Value for money | 3 | 4 | 4 | 4 | 4 | 3 | 2 | 4 | 4 |
| Total (out of 35) | 30 | 31 | 30 | 27 | 25 | 22 | 28 | 30 | 30 |

Key: 5 *Excellent*, 4 *Good*, 3 *Satisfactory*, 2 *Poor*, 1 *Very Bad*

**How the internal RAM/ROM boards, external ROM sockets and external RAM/ROM boards score out of 35**

# MICROWORLD

## · COMPUTER GROUP ·

### EDUCATIONAL SPECIALIST

Microworld are Scotland's sole Scottish based distributor with vast experience of Econet and can offer installation, service, advice and supply throughout the U.K. Our London and Birmingham offices are now open to service the entire country. Please call for our latest Educational Prices or phone for our list of dealers nationwide. Remember we are never ever undersold.

### BRANCH NETWORK THROUGHOUT THE U.K.

**LONDON**
140 Battersea Park Road
London
01 627 4840

**BIRMINGHAM**
39 Waterloo Street
Birmingham
021 236 7772

**GLASGOW**
11 Bath Street
Glasgow
041 332 1116

Anderston Cross Centre
Glasgow
041 226 3011

**EDINBURGH**
4 Saint Andrew Square
Edinburgh
031-557 4196

12 Leven Street
Edinburgh
031 228 1111

**ABERDEEN**
77 Holburn Street
Aberdeen
0224 571735

# IN THE MARKET?

**We at Microworld believe that our price to end user and education cannot be beaten and accordingly we give you our**

# PRICE PROMISE

**Phone now for details.**

**(Subject to conditions)**

## Disc Drives

| | |
|---|---|
| Cumana Disc Drives | |
| CSX531, 3.5" disc | £59.95 |
| CSX100 40T, single, no psu | £89.95 |
| CSX400 80T, single, no psu | £119.95 |
| CS100 40T, single, with psu | £109.95 |
| CS400 40T, single with psu | £139.95 |
| CD200 40T, dual, with psu | £209.95 |
| CD800/S 80T, dual, with psu | £259.95 |
| DFS Kit 8271 | £89.00 |
| ADFS Kit 1770 (unfitted) | £59.95 |
| Cumana QFS Double Density Kit | £39.95 |

**We also stock various other brands of disc drives including Pace and Mitsubishi.**

## Monitors

| | |
|---|---|
| Microvitec 1431 Standard | £205.00 |
| Microvitec 1451 Medium | £279.00 |
| Microvitec 1441 High | £425.00 |
| BMC High Res. Green Screen | £109.95 |
| Zenith ZVM Green or Amber | £89.95 |

## Computers

| | |
|---|---|
| BBC Master 128k | £499.00 |
| Atari 520ST Computer with: 3.5" disc drive, monitor, mouse and software | £649.00 |
| Atari 520ST System as above with Kaga Taxan Printer | £699.00 |
| Amstrad Range | P.O.A. |
| Epson Personal Computer Range | P.O.A. |
| Nimbus Range | P.O.A. |
| MBC 555 16-BIT with Zenith Green Monitor, Wordstar, Calcstar and Star SG-10 NLQ printer Cable | £699.00 |
| Apricot F1 with Apricot F1 Monitor Star SG-10 Printer and Cable | £759.00 |
| Apricot F1 Computer | £399.00 |

## ROM Software

| | |
|---|---|
| View | £50.00 |
| Viewsheet | £48.00 |
| Wordwise Plus | £52.00 |
| Printmaster | £34.95 |
| Graphics | £32.95 |
| Disc Doctor | £29.95 |
| AMX Mouse, CAD system | £75.95 |
| AMX Pagemaker | £49.95 |
| AMX 3D-Zicon | £24.95 |
| AMX Database | £24.95 |
| AMX XAM | £24.95 |
| AMX Desk | £24.95 |
| AMX Utilities | £14.95 |
| Datagem | £99.95 |
| Gremlin | £27.95 |
| Viewstore | £50.00 |
| GXR | £29.95 |
| Intersheet | £29.95 |
| Interchart | £29.95 |
| Interword | £29.95 |
| Basic Editor | £39.95 |

## Printers

| | |
|---|---|
| Star SG10 | £219.00 |
| Star SG15 | £329.00 |
| Epson LX80 | £229.00 |
| Epson FX80+ | £369.00 |
| Canon PW 1080A | £259.00 |
| Canon PW 1156A (Wide Carriage) | £439.00 |
| Canon PJ 1080A Colour printer | £455.00 |
| Juki 6100 | £279.00 |
| JP101 Sparkjet printer | £129.95 |
| Kaga Taxan KP810 | £199.00 |
| Petal MA 20 (same as Juki 6100) | £279.00 |
| **SD-10 160 cps** | £339.00 |
| SD-15 160 cps wide carriage | £469.00 |
| BBC printer cable, 1 metre | £10.00 |
| BBC printer cable, 1.5 metre | £12.50 |
| BBC printer cable, 2 metre | £15.00 |

## Peripherals

| | |
|---|---|
| Acorn Bitstick | £375.00 |
| Acorn Teletext Adaptor | £199.00 |
| Acorn Z80 Second Processor | £369.00 |
| Acorn 6502 Second Processor | £195.00 |
| Voltmace Single Joystick | £14.95 |
| Voltmace Double Joystick | £19.95 |
| Single Sheet-feed for Juki 6300 | £229.95 |
| Epson Friction Feed for LX80 | £29.95 |
| Electron Plus Three Adaptor | £199.00 |
| Electron Plus One Adaptor with free Harrier Joystick | £49.95 |

RESEARCH MACHINES
MICROCOMPUTER SYSTEMS

RM NIMBUS



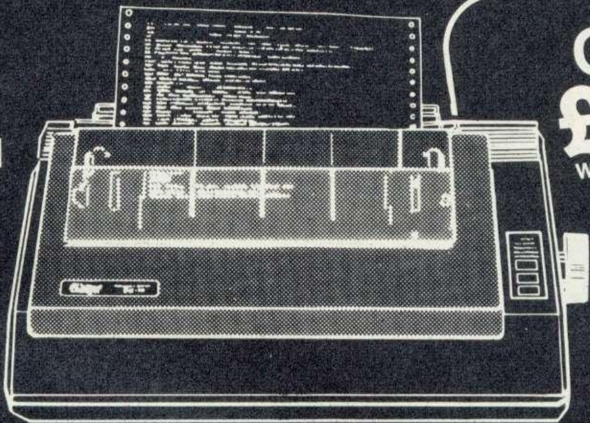
# MICROWORLD

**GLASGOW: 041-226 3011 041-332 1116**

## star

FEATURES

1 120cps — bidirectional logic seeking
2 Near letter quality mode
3 Inexpensive ribbons
4 Epson and IBM compatible
5 Easily accessible dip-switches
6 Friction and Tractor feeds
7 Standard parallel Interface-free BBC cable
8 12 months guarantee and our
 7 day Money Back Guarantee
9 Free Printmaster ROM worth £34.95
10 Free Wordwise ROM worth £44.00
11 Free Carriage by Securicor Courier Service.



**ONLY £209**
With FREE CABLE & CARRIAGE

**VERY VERSATILE**
Also SG-15 NLQ Wide carriage 132 column version. Only **£329.00**

**STAR SG-10**

## KAGA TAXAN KP810

FEATURES

1 140 c.p.s. and 27 c.p.s. NLQ mode
2 Friction and Tractor Feed
3 Parallel as standard
4 Epson compatible control codes

**R.R.P. £329**

**OUR SPECIAL OFFER**



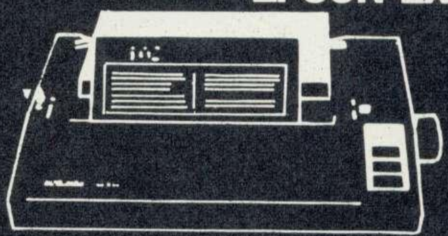

inc. VAT
**£199**
**with FREE BBC Cable**

## EPSON

FEATURES

1 100cps — bidirectional logic seeking
2 NLQ Rom Font as standard
3 Italics, bold, underlining and many more font styles
4 Compatible with most software
5 Tractor feed — only £25 extra.

**RRP £295**
**OUR PRICE ONLY £229**
**EPSON LX80**



## AN OFFER THAT CANNOT BE REFUSED!

## ATARI 520ST

FEATURES

1 512K Ram
2 68000 Processor with networking
3 Professional Software free
4 512 Colours on screen
5 8MHz clock speed
Gem operating system
Complete system CPU, Disk Drive, Monitor and Mouse included
Free software includes
Basic, Logo, 1st Word, DB Master.
6 Free Kaga Taxan Printer



**ONLY £799**
Inclusive of VAT
WITH FREE KAGA TAXAN KP810

**Special Offer; FREE KAGA TAXAN KP810 PRINTER WORTH £199 WITH EVERY 520ST**

# MICROWORLD

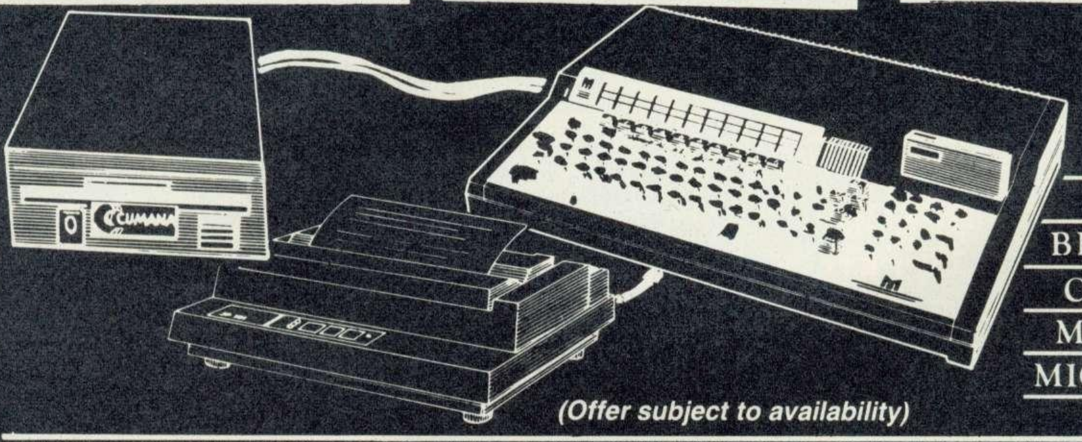
EDINBURGH: 031-557 4196 031-228 1111

# MASTERFUL OFFER FROM MICROWORLD

**1 OFFER**
**BBC MASTER 128K,** JP 101 Sparkjet Printer, BBC Printer Cable, carriage by Securicor.
**WORTH £808**
**FOR £499**

**2 OFFER**
**BBC MASTER 128K,** Cumana CSX 531 3.5″ disc drive, manuals, formatting disc and cables, carriage by Securicor.
**WORTH £799**
**FOR £499**

**3 OFFER**
**BBC MASTER 128,** JP101 Sparkjet Printer, Cumana CSX531 3.5″ disc drive, manuals, formatting disc and all cables, carriage by Securicor.
**FOR £545**




BRITISH BROADCASTING CORPORATION MASTER SERIES MICROCOMPUTER

*(Offer subject to availability)*

# 10 ACORNSOFT

*DISC GAMES WORTH £120.00*

**FOR**

# £19.99

INCL V.A.T.

N.B. CARRIAGE £2 EXTRA

Make no mistake this offer is yet another Microworld exclusive. Nowhere else will you find all this quality disc software for so little. All the games are both 40 and 80 track compatible and therefore suitable for use with any 5¼″ disc drive and your BBC B Computer. This means that each disc costs you only £1.99 each, we doubt you could buy quality blank discs at that price. Here are the titles from which we will send you ten:

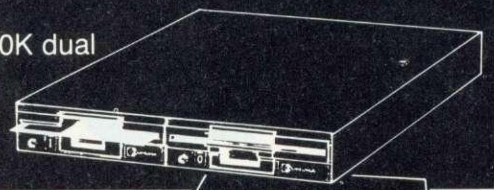
1 QUEST
2 MONSTERS
3 SNAPPER
4 ROCKET RAID
5 SPHINX
6 METEORS
7 ARCADIANS
8 PLANETOID
9 SUPER INVADERS
10 FIREBUG
11 COUNTDOWN TO DOOM
12 STARSHIP COMMAND
13 HOPPER
14 CAROUSEL
15 KINGDOM OF HAMIL
16 CRAZY TRACER
17 DROGNA
18 FREEFALL
19 METEOR MISSION
20 BOXER
21 TETRAPOD
22 VOLCANO
23 BLACK BOX

# MICROWORLD

·LONDON: 01-627 4840 BIRMINGHAM: 021-236 7772·

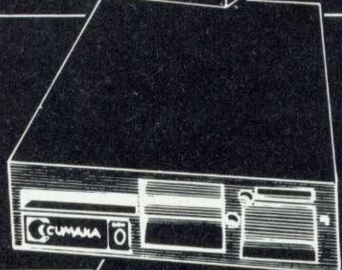
## CUMANA DISC DRIVES

## CD 800S
5¼″ Double-sided 800K dual disk drive 40/80 track switchable with own Power supply



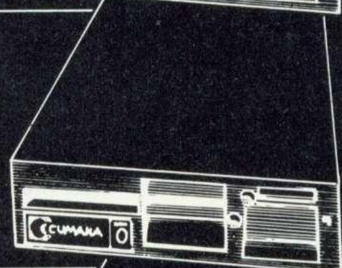
£259.95* ONLY R.R.P.

## CS 400S
5¼″ Double-sided 400K single disk drive 40/80 track switchable with own Power supply



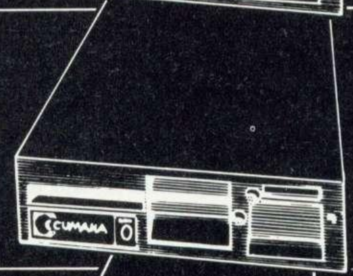
£139.95* ONLY R.R.P.

## CSX 400S
5¼″ Double-sided 400K single disk drive 40/80 track switchable. Powers from the BBC computer



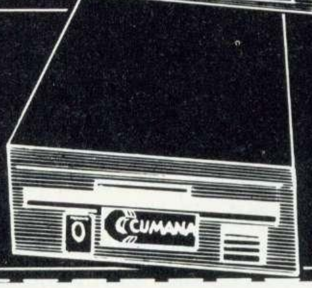
£119.95* ONLY R.R.P.

## CSX100
5¼″ Single-sided 100K single disc drive 40 track. Powers from the BBC computer



£89.95* ONLY R.R.P.

## CSX 531
3.5″ Single-sided 100K single disc drive 40 track. Powers from the BBC computer.



£59.95* ONLY R.R.P.

* Add £14.95 to price for our pack of 10 Acornsoft games discs worth £120.
* Equivalent drives may be supplied. Add £69.00 for 8271 DFS Kit with DNFS.

## How to Order

Orders by post welcomed: please mail coupon with payment.
Telephone orders welcome: call 01-627 4840 (London) or 031-228 1111 (Edinburgh) or 041-332 1116 (Glasgow) or 0224 571735 (Aberdeen) or 021-236 7772 (Birmingham).
We also welcome Government and Educational orders.
All products supplied include our own 12 months guarantee backed by our own service centre staffed by fully qualified engineers.
Order with confidence, 7 days money back guarantee.
All charges include VAT and carriage charges by courier. Dealer enquiries and personal callers welcome. All offers stated here are available through any of Microworld's 50 dealers nationwide.
The right is reserved to alter prices without prior notice.
All items subject to availability. E&OE.

## MAIL ORDER

To: Microworld Distribution, Dept. AU, Park House, 140 Battersea Park Road, London SW11
01-627 4840

Please send me ____________________

☐ I enclose a cheque for £ ______ payable to Microworld Computer Systems Ltd

☐ Please debit my Access/Visa/American Express Account

No ____________ Signed ____________

Name ____________ Address ____________

# COMPATIBILITY QUEST

**Join *Acorn User's* quest to find which ROMs work with what, and to persuade software houses to leap into action to solve those incompatibility problems**

***Simon Williams***

With only 16 slots available for expansion ROMs, and many times that number of products vying for attention, it makes sense to choose wisely, by studying advertisements and reading reviews in magazines such as *Acorn User*. Even then, though, you're guaranteed little, due to an exasperating and increasingly prevalent problem which rarely seems to get a proper airing.

The more sideways ROMs you buy, the more conflicts appear between different products. These 'tiffs' vary from one ROM answering another's command, to two ROMs refusing to live in the same machine together. There are various ways round these little battles, but none of them make life any easier for the average micro user.

### Avoiding conflict

You can buy an extension zero insertion force (ZIF) socket and only plug in the ROM you want at any time. This can be awkward, however, if you need to call more than one ROM during a session. An alternative is a couple of sideways RAM units, into which you can load disc images of your own ROMs, but this removes the convenience of having 'instant' ROM software in the first place.

Another possibility is the 'ROM manager' ROM, which will 'knock out' other ROMs on request. Some routines even survive a hard reset and the chips can then only be reawoken with a specific command.

It still doesn't solve the problem of working out which ROM caused the conflict in the first place, however.

So why not find out from the software publisher before buying his product? Mainly because the standard reply is 'It's impossible to test our new product with every piece of software on the market'. Fair enough, but they should at least try some of the more obvious combinations. I recently had a new ROM which made *Wordwise Plus*, normally a very mild-mannered chip, include random disc catalogues in new text files! How about the disc utility chip which so disliked *Disc Doctor* that it turned it off each time the micro was reset! Or the trio of chips XROM, YROM and ZROM which require an impossible order of precedence, eg:

XROM > YROM AND ZROM
YROM > ZROM
ZROM > XROM

Not only are ROM conflicts annoying, but are often extremely hard to trace. Intermittent 'scuffles' may only break out when using obscure sections of code, and the conditions are then very difficult and time-consuming to reproduce. Gradually removing chips from an expansion board until you hit on the offending component may be some people's idea of fun but I've far better things to do with my computing time.

So what's to be done? Well, for a start, software companies could be encouraged to stick to the rules laid down by Acorn. Many of the conflicts between ROMs are brought about because the code is not written using Acorn's service routines.

For instance, ROMs which access the screen directly are asking for trouble. Then there are ROMs which need workspace (normally 'language' ROMs) and aren't choosy about where they find it. However clever a program is, it will not gain popular acceptance if it sits there in the micro giving no quarter to any other program in the machine.

But it isn't all down to the software companies. There are things users can do to help reduce the problems, and the most obvious of these is to help compile a list of troublesome ROMs. Once the software companies know that a particular ROM isn't happy with others, the onus is on them to sort out the problem.

### You can help

What we're proposing is a chart of conflicting ROM software. Write in and report any ROMs you're having trouble with – send your comments to: Simon Williams, ROM Compatibility, *Acorn User*, 141-143 Drury Lane, London WC2B 5TF. This doesn't mean having a dig at a product which doesn't do what you imagined it would, but rather providing details of clashes you've come across in your machine. It takes two to conflict so you should have isolated the offenders before writing to us.

What we'll need to compile a list is:

- Basic specification of your machine: make, type and version of any DFS.
- Make, version and amount of any extra memory (shadow or sideways).
- Make and type of any second processor.
- Make and type of any peripherals attached when the conflict occurs.
- Make and version of any other ROMs in your machine (other than those below).
- Make and version of the two ROMs you think are causing the conflict.
- Nature of the conflict (eg, machine crashes with a row of asterisks in the middle of the screen). Is there an initial letter you can use to avoid conflict?
- Response of the software company, if you've reported the trouble (eg, 'We're working on it' or 'It's fixed in version 7.23').
- Any fix you've discovered to resolve the conflict in question.

The more help you can give us in reporting troubles you've had with conflicting software, the sooner we can help other users and the software companies to reduce the problem.

*To kick off our compatibility quest we're presenting a list of ROMs and what Acorn micro's they're compatible with on the yellow pages. You'll also find an embryonic chart of conflicting ROMs – we want you to supply more details – and a table of prefix characters used by ROMs – see yellow pages 119 to 120*

# COMPETITION

## ENTER THE GREAT PI RACE

**We challenge you to calculate pi the fastest – and win one of three Kaga Taxan KP810 printers**

***Tony Quinn***

The idea of this month's competition is quite simple (in theory at least!). What we want you to do is to calculate the value of that great constant pi! Of course, its value has yet to be set definitely as it is one of those numbers that goes on and on . . . to as many decimal places as you care to choose. What we want you to do is calculate the value rounded up to 500 decimal places accurately, and print out the value of each place on the screen as it is calculated, in the shortest possible time.

The idea came from Peter Corlett. He and James Tout had written a program in assembler that calculated pi to 500 decimal places in less than a minute. The rules are:

- Your program must use one of the recognised standard series (see box) for calculating the correct value of pi rounded up to 500 decimal places as given in figure 1.
- All calculations must be done within the program. No values can be read in. Entries which simply divide one number by another will not be allowed.
- Each place must be displayed on the screen as it is calculated.
- The time taken must be displayed on the screen when the program has finished.
- All programs must be written in mode 6.
- No DATA statements are allowed.
- The programs must be written legally, so no poking the screen or using routines in the Basic or MOS, other than those documented by Acorn, ie, OS calls.
- Programs cannot use sideways RAM or shadow memory on any machine.
- The program must be your own work and not have been commercially published. Copyright on all entries is with the author.

```
3.141592653589793238462643383279502884197169
39937510582097494459230781640628620899862803
48253421170679821480865132823066470938446095
50582231725359408128481117450284102701938521
10555964462294895493038196442881097566593344
61284756482337867831652712019091456485669234
60348610454326648213393607260249141273724587
00660631558817488152092096282925409171536436
78925903600113305305488204665213841469519415
11609433057270365759591953092186117381932611
79310511854807446237996274956735188575272489
122793818301194913
```

**Figure 1. The correct value of pi rounded up to 500 decimal places – calculate this as fast as possible**

There are three groups for entries, and the winner in each group will receive a Kaga Taxan KP810 dot matrix printer with a retail price of £229.

**1** Programs written in Basic. These can be written on an Electron, BBC B/B+ or Master and will be tested on a standard Master in our offices. The program must be written legally. Timing must be done with Basic's TIME function to one-hundredth of a second.

**2** Programs written in Basic/assembler on Electron, BBC models B, B+ and B+128. You must use your own timing loop with the system clock using OSWORD calls 1 and 2. Machine code must be assembled in the main user memory, ie, above &E00.

**3** Programs written in Basic/assembler on a Master 128. Group 2 rules apply.

Entries must be submitted on disc or cassette and will be tested on our standard machines in each case. The programs must be written for standard machines without extra hardware such as second processors. Your entry must include the machine it was written on, whether it is in Basic or assembler, and the time (rounded up to the nearest second) marked on the envelope in the top left hand corner. For example: BBC B/Basic/300sec.

Entries which do not have this information on the envelope will be disqualified.

In the case of a tie, the winning entry will be decided by the best suggestion for a competition in *Acorn User*.

We regret that entries cannot be returned, and no correspondence or phone calls will be answered. Winners will be notified by post and their names printed in the September issue.

Send your entries to: *Acorn User*, Redwood Publishing, 141-143 Drury Lane, London WC2B 5TF. Closing date is May 19 1986.

**1** Leibnitz' formula (1674):

$$\pi = 4\left(1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \cdots\cdots\right)$$

**2** Another version of Leibnitz:

$$\pi = 2 + 16\left(\frac{1}{1*3*5} + \frac{1}{5*7*9} + \frac{1}{9*11*13} + \cdots\cdots\right)$$

**3** Machin's formula (1706):

$$\pi = 16*\arctan\left(\frac{1}{5}\right) - 4*\arctan\left(\frac{1}{239}\right)$$

$$\text{where } \arctan(x) = x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + \frac{x^9}{9} - \cdots\cdots$$

(Reference: *Problems for Computer Solution* by Gruenberger and Jaffray, published by John Wiley and Sons, currently out of print but you should find it in your local library)

**The three standard ways of calculating pi**

NAME

ADDRESS

TELEPHONE

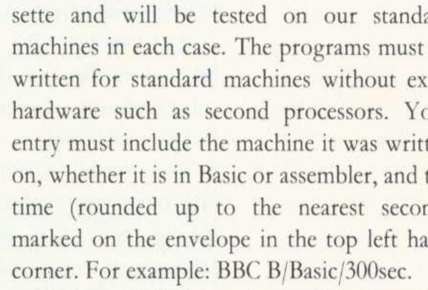
MY ENTRY IS WRITTEN IN BASIC/ASSEMBLER*

MY TIME IN SECONDS IS

MY MICRO IS

MY SUGGESTION FOR A FUTURE COMPETITION IS

*Please delete as applicable

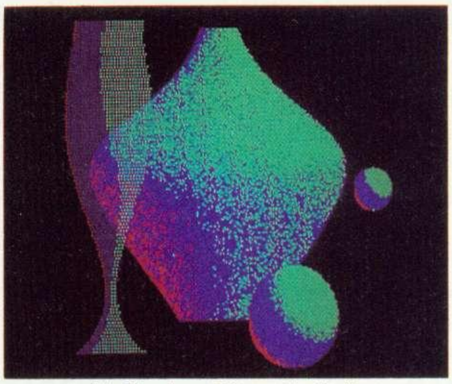



**Kaga Taxan KP810 – we've got three to be won**

# DISC SUBSCRIPTIONS

## ACORN USER OFFER

# Subscribe to our monthly listings disc and save £9

**Screens from past listings discs – the pencil sharpener appeared in March and 'Scene' in April**

*Acorn User* monthly listings discs have proved to be enormously popular since their introduction in October 1985, so much so that we've decided to offer you the chance to take out a subscription to receive one every month at a really special price.

The price of £60 will save you £9 when you take out a year's subscription to our monthly listings discs – if you sent for each one separately it would cost £69. (Overseas readers please add £7 for postage.)

The discs contain all the programs presented in each issue of *Acorn User*, so you don't have to type in the listings from the yellow pages – saving you time and trouble as well as money. Just load the disc and off you go.

Plus there's an added bonus – each month the discs contain screens featured in the magazine which are not included on the monthly listings cassettes, so you get even more for your money!

You can see some of these graphics screens pictured above.

The discs are supplied in 5.25in 40 track format, and conversion instructions are included for 80 track disc users.

Act now! This offer is only valid until May 30 1986. Complete the form below and post it, with your remittance, to the Subscriptions Manager, Acorn User Disc Subscription Offer, Redwood Publishing, 141-143 Drury Lane, London WC2B 5TF.

**Yes!** Please start my disc subscription for *Acorn User* monthly program listings from the ______________ issue.

☐ UK £60 ☐ Overseas £60 (plus £7 for postage)

☐ I enclose a cheque/postal order/sterling bank draft made payable to Redwood Publishing for £______________

Please debit my Access/American Express/Barclaycard A/c No

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ Expiry date ☐☐☐☐

NAME

ADDRESS

POSTCODE

SIGNED DATE 98-5

Send this form with your remittance to:

**Subscriptions Manager, Acorn User Disc Subscription Offer, Redwood Publishing, 141-143 Drury Lane, London WC2B 5TF** HA12

# USERRAM

## ACORN USER OFFER

# Easy-fit sideways RAM at easy prices!

**● 16k ● Fully-compatible with BBC B/B+ ● Backed by *Acorn User* ● 3 minutes to fit ● Software support ● Comprehensive manual ● Disc ● Simple for schools ● Ideal for Econet ● No soldering**

Take a piece of software, load it in UserRAM using the utilities provided and it can be accessed instantly using a '*' command or run as a Basic program.

The *Acorn User* UserRAM is as easy to install as a sideways ROM, with just one lead to clip onto the leg of a chip (there's a choice of two) – there's no need to unplug the chip to fit the lead. It takes three minutes to do.

A comprehensive printed manual gives fitting instructions, information on how to create your own sideways RAM software and technical notes on how the utilities provided work. Also, a standard disc (which runs on 40 and 80 track drives with any DFS and is unprotected) is supplied with all the basic utilities needed. One year's guarantee is given, with postage and VAT included.

**Copyright notice:**
No party connected with this product will give aid to anyone seeking to break software copyright. *Acorn User* welcomes details from software houses willing to license schools and other users of UserRAM for their products.

### So easy to fit

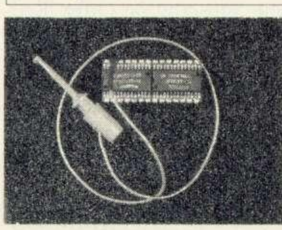
- Switch off BBC micro. Remove lid and keyboard to reveal sideways ROM sockets.
- Insert UserRAM into any empty sideways ROM socket, just like a normal chip.
- Take lead over to left of BBC board and clip to leg of a chip (does not have to be soldered, or chip removed).
- Replace keyboard and lid.
- That's it! You're ready to check the installation with the software supplied.

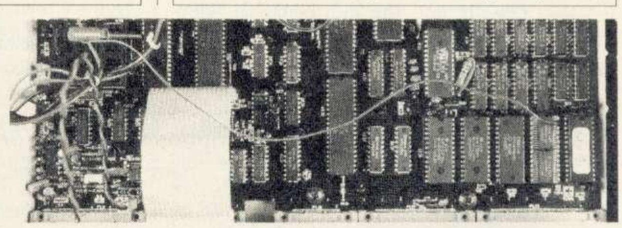
### Pack 1 £38.50

- 16k sideways RAM chip with attached connecting lead.
- Disc of utility software.
- Instruction booklet.

### Pack 2 £57.95

- As in pack 1, plus
- 19 new utilities including printer buffer, *FORMAT and *VERIFY for discs, ROM auto boot, two OS calls, save graphics screen, list function keys, and more.
- BBC Micro ROM Book by Bruce Smith (published by Collins at £9.95).





**Fill in this coupon and send it (or a copy) with your remittance to:**
**UserRAM, Acorn User, 141-143 Drury Lane, London WC2B 5TF.**

☐ Please send me ______________ copies of pack 1 at £38.50 each

☐ Please send me ______________ copies of pack 2 at £57.95 each

I enclose a cheque/postal order made payable to Frondwood Ltd for

£ ______________

Please debit my Access card A/c No

Expiry date

NAME

ADDRESS

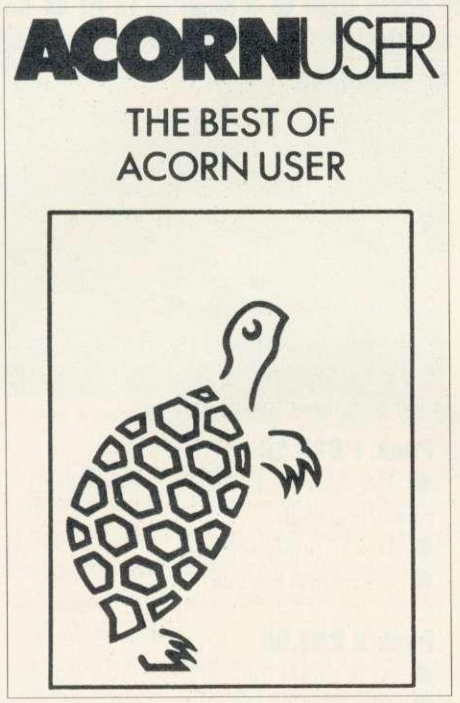
POSTCODE 99-5

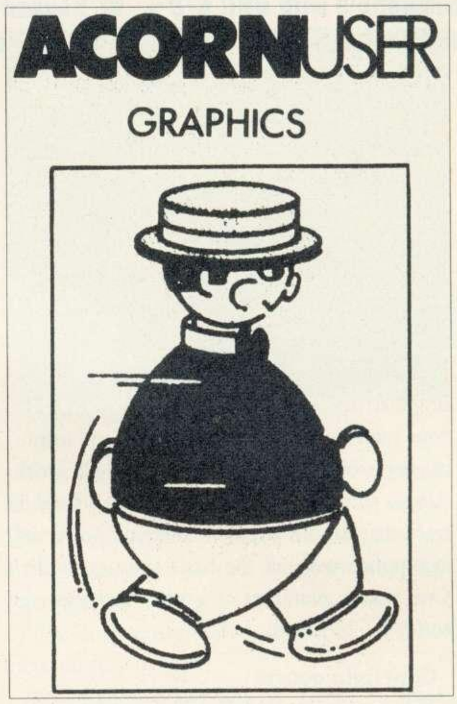
SIGNED DATE HA6

# CASSETTE SUBSCRIPTIONS

## ACORN USER OFFER

# Two free special cassettes when you subscribe now - worth £7.90




Subscribe to the *Acorn User* monthly program listings on cassette, and we will send you both of our special cassettes, worth £3.95 each (see page 101 for details).

These are the entertaining and ever popular *Graphics* cassette and the indispensable selection of programs from the magazine contained in the *Best of Acorn User*.

Don't wait, subscribe now, while our offer lasts. Remember our cassettes are suitable for use with the Electron and the BBC micro.

Complete the form below and post it, with your remittance to Subscriptions Manager, Acorn User Cassette Subscription Offer, Redwood Publishing, 141-143 Drury Lane, London WC2B 5TF.

**Yes!** Please start my cassette subscription for *Acorn User* monthly program listings from the ____________ issue and send me my **free** cassettes

☐ UK £45 ☐ Overseas £45 (plus £7 for postage)

☐ I enclose a cheque/postal order/sterling bank draft made payable to Redwood Publishing for £____________

Please debit my Access/American Express/Barclaycard A/c No

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ Expiry date ☐☐☐☐

NAME ____________

ADDRESS ____________

POSTCODE ____________

SIGNED ____________ DATE ____________ 100-5

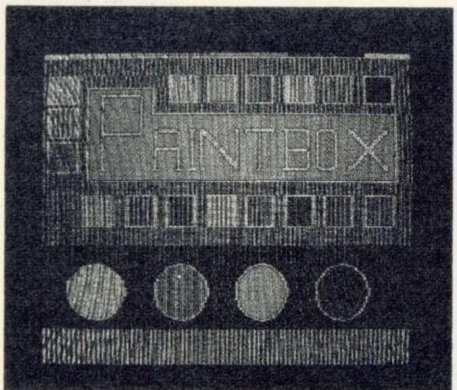
Send this form with your remittance to:
**Subscriptions Manager, Acorn User Cassette Subscription Offer, Redwood Publishing, 141-143 Drury Lane, London WC2B 5TF** HA2

# SPECIAL CASSETTES

## ACORN USER OFFER

# Special cassettes £3.95 each

## ACORN USER GRAPHICS CASSETTE




**The Graphics Cassette's Paintbox palette**

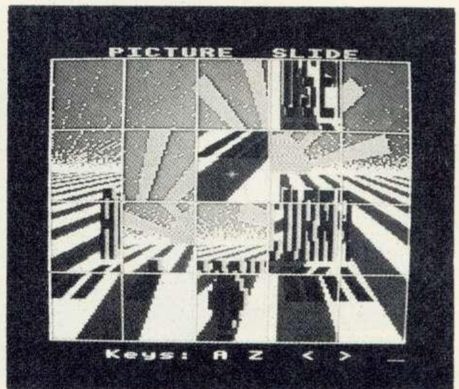
Four of the most popular and useful graphics programs that we've presented in *Acorn User* – Rob Fenton's *Paintbox,* Peter Sandford's *Colfill* and *Dotfill* and Harry Sinclair's Sprite designer – are now available on one cassette, suitable for use with the BBC micro or Electron, competitively priced at £3.95.

*Paintbox*, (February 1985), offers you a wide palette of facilities – airbrushing, drawing circles and squares, colour filling, colour mixing and textured effects – and it's fast!

Peter Sandford's *Dotfill* and *Colfill* (January and February 1985) allow you to produce bar charts, pie charts, maps, etc, with up to 28 coloured fill patterns and 24 tone patterns, and to mix foreground and background colours.

Harry Sinclair's Sprite designer from the September, October and November 1984 issues of *Acorn User* lets you design full-colour cartoon figures quickly, then edit, clone or mirror them and move them around the screen.

## BEST OF ACORN USER CASSETTE




**Picture Slide from the Best of Acorn User**

The second cassette to be introduced in our developing range of special cassettes, *The Best of Acorn User*, contains a comprehensive selection of 11 program listings from past issues, which you will find entertaining and useful.

It features Malcolm Banthorpe's Turtle Graphics program, an easy introduction to Logo; an all screen mode printer dump for Epson and Epson-compatible printers; a bad program recovery routine for those times when it seems all is lost; a selection of sideways RAM utilities to help you make the most of your discs and ROMs, and two games to keep you amused, *Picture Slide* and *Quadline*.

Also included are a 40/80 track disc formatter, a tape to disc transfer routine, a disc menu and a painting program.

To order both or either cassette just complete the form and send it with your remittance to Acorn User Products, PHS Mailings Ltd, PO Box 14, Horley, Surrey RH6 8DW.

PLEASE SEND ME: ________ Acorn User Graphics cassette(s) and

________ Best of Acorn User cassette(s) at £3.95 each

I enclose a sterling cheque/postal order for a total of £ ______ made payable to Redwood Publishing (Please add £1 for package and postage on overseas orders)

Please debit my Access/Barclaycard A/c No ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ Expiry date ☐☐☐☐

NAME ________

ADDRESS ________

POSTCODE ________

SIGNED ________ DATE ________ 101-5

Send to: **Acorn User Products, PHS Mailing Ltd, PO Box 14, Horley, Surrey RH6 8DW.** 24 hour phone service on (02937)72208. Please allow 28 days for delivery. H59

# USERROM

## ACORN USER OFFER

# Acorn User on a chip for £19.95



The *Acorn User UserROM* brings the best of *Acorn User* permanently into your micro. Put together by our technical editor, Bruce Smith, this 8k ROM chip is packed with your favourite routines that have appeared in the pages of *Acorn User* over the past two years. Simply plug the ROM chip into a spare sideways ROM socket and all the routines are instantly accessible via easy to use * commands – what could be simpler!

Routines include the popular colour fill and dot fill routines, bad program recovery, variable lister, function key lister, a graphics compiler, a circle drawing routine, a bulletin board, screen compressor, on screen character fonts, ROM lister, sound compiler, plus lots, lots more!

Quite simply invaluable routines that the serious Acorn user cannot be without!

*UserROM* gives the following extra commands, either typed from the keyboard, or included as part of a program: *BORDER – sets up a mode 7 screen with a standard screen border prior to use of *SCROLL; *CHECK – produces a checksum listing of a program in memory; *CIRCLE – will draw a circle in any graphics mode; *COLFILL – a sophisticated, recursive colour filling routine, provides 27 colourful fills; *COMPRESS – takes a graphics screen and compresses it in size thereby taking less storage space on disc and tape; *DOTFILL – a recursive, dot filling graphics routine, provides 23 new black and white shades; *EXPAND – returns a previously *COMPRESSed screen to its original state; *EXPLODE – explodes the alphanumeric character set into RAM; *FKEYS – lists the definitions in function keys; *GOFF – turns the graphics compile mode off; *GON – turns the graphics compile mode on; *ITALICS – selects an italic character font, *MODERN – selects a 'modern' character font; *NORMAL – selects the normal character font; *PROGRAM – recovers a bad program; *ROMS – lists the sideways ROMs present in your machine; *SCREEN – saves the current graphics screen to disc or tape; *SCROLL – moves a scrolling message across the mode 7 screen; and *VARS – lists all names used for non-integer variables.

A 22-page manual is included, which explains in clear simple terms how to get the most from your *UserROM*, and includes many demonstration programs showing how to use the new commands.

Note: Acorn User retains the right to alter the contents of UserROM without obligation.

Please send me __________ UserROM(s) at £19.95 each

(Please add £1 for postage and packing for overseas orders)

I enclose a sterling cheque/postal order made payable to Redwood Publishing for

£ __________

Please debit my Access/Barclaycard A/c No

Expiry date

NAME

ADDRESS

POSTCODE

SIGNED DATE 102-5

Send to: **Acorn User Products, PHS Mailing Ltd, PO Box 14, Horley, Surrey RH6 8DW.** 24 hour phone service on (02937) 72208. Please allow 28 days for delivery. HA13

ACORN USER OFFER

# May listings on cassette £3.75 or disc £5.75



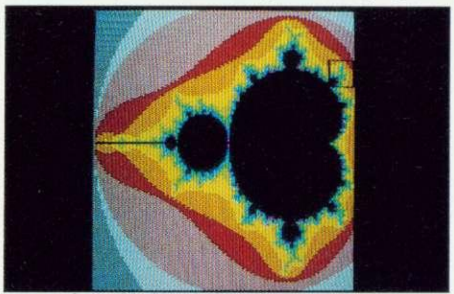
Use *Header* to customise your own front page



This selection menu offers easy access to programs



There's always a graphics bonus on the disc . . .


. . . such as this Mandelbrot set screen

May's monthly program listings cassette features David Johnson-Davies' Mandelbrot set graphics program, a utility to speed up data transfers across the Tube, and a character dump program devised by our printer expert George Hill.

The disc version includes some extra goodies. David Acton's superb *Header* program which you can customise to produce your own 'front end'; a simple-to-use menu selection providing instant access to all programs with the minimum of fuss; while the detailed catalogue supplies full information on each program. And of course there is the fabulous graphics bonus – this month it includes stunning Mandelbrot graphics screens. At £5.75 it's an absolute steal!

Both tape and disc are available and can be ordered using the form below. Back issues of discs and cassettes are also available.

Please send me a cassette of all major BBC micro and Electron program listings

Please state which issue(s)__________ at £3.75 each

Or disc (available from Oct '85) __________ at £5.75 each

(Please add £1 for postage and packing on overseas orders)

I enclose a sterling cheque/postal order made payable to Redwood Publishing for a total of

£ __________

Please debit my Access/Barclaycard A/c No

Expiry date

NAME

ADDRESS

POSTCODE

SIGNED DATE 103-5

Send to: **Acorn User Products, PHS Mailing Ltd, PO Box 14, Horley, Surrey RH6 8DW.** 24 hour phone service on (02937) 72208. Please allow 28 days for delivery. HA4

ORDER FORM

# ACORNUSER — SUBSCRIPTIONS

Please start my subscription to *Acorn User* from the ____________ issue

| | | 12 months | 24 months |
|---|---|---|---|
| 01: | UK | £17.50 ☐ | £35 ☐ |
| 02: | Europe | £25 ☐ | £50 ☐ |
| 03: | Middle East | £30 ☐ | £60 ☐ |
| 04: | The Americas and Africa | £35 ☐ | £70 ☐ |
| 05: | All other countries | £40 ☐ | £80 ☐ |

NAME ____________

ADDRESS ____________

Please answer these questions to help us improve your magazine.

1 Do you use your micro for?:
1 ☐ school 2 ☐ business 3 ☐ hobby

2 Do you have, or intend to buy, any of the following?:
1 ☐ monitor 2 ☐ disc drive 3 ☐ second processor
4 ☐ printer 5 ☐ modem

3 How many software packages do you think you will buy in the next months?:
1 ☐ 0-5 2 ☐ 6-10 3 ☐ 10 or more

☐ I enclose my cheque/postal order/sterling bank draft payable to Redwood Publishing for £ ____________

☐ Please debit my Access/American Express/Barclaycard

Account no. ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Expiry date ☐☐☐☐

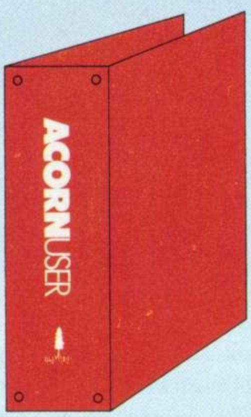
SIGNED ____________ DATE ____________ 104-5

Send this form, with your remittance, to Acorn User Subscriptions, Redwood Publishing, 141-143 Drury Lane, London WC2B 5TF

---

ORDER FORM

# ACORNUSER — BINDERS




## BINDERS

In red with silver logo on the spine.
Holds 12 issues of over 200 pages.
ONLY £4.75 inc. p&p.

______ RPO1 Binders @ £4.75 £____

Please add £1.00 each for overseas items.
Please allow 28 days for delivery.

NAME ____________

ADDRESS ____________

Please send me ______ binder(s) at £4.75 each. (Please add £1 for postage and package for overseas orders)

☐ I enclose my sterling cheque/postal order for a total of £ ______ made payable to Redwood Publishing

☐ Please debit my Access/Barclaycard

Account no. ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Expiry date ☐☐☐☐

SIGNED ____________ DATE ____________ 104-5

Send this form, with your remittance, to Acorn User Services, PHS Mailing Ltd, PO Box 14, Horley, Surrey RH6 8DW. Please allow 28 days for delivery.

---

ORDER FORM

# ACORNUSER — BACK ISSUES

## BACK ISSUES

The following back issues are available:
1982 September, October, November and December
1983 January, July, September, October, November and December
1984 January, March, May, June, July, August, September, October, November and December
1985 January, March, April, May, June, July, August, September, October, November and December
1986 January, February, March and April

If you need further details about the contents of these issues send an sae to Back Issues, Diane Wiltshire, Acorn User, 141-143 Drury Lane, London WC2B 5TF.

**24 HOUR PHONE SERVICE (02937)72208**

Please send me the following issues ____________

at £1.25 each. (Please add £1 per item for overseas orders)

NAME ____________

ADDRESS ____________

☐ I enclose my sterling cheque/postal order for a total of £______ made payable to Redwood Publishing

☐ Please debit my Access/Barclaycard

Account no. ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Expiry date ☐☐☐☐

SIGNED ____________ DATE ____________ 104-5

Send this form, with your remittance, to Acorn User Software, PHS Mailing Ltd, PO Box 14, Horley, Surrey RH6 8DW. Please allow 28 days for delivery.

# YELLOW PAGES

## INDEX/COMPATIBILITY

## INDEX

| Program | | Page | BBC B | BBC B+/128k | BBC ADFS | Shadow RAM | Electron | Electron with Plus 1 | Electron with Plus 3 and Plus 1 | Master 128 | Master 128 with ADFS | 6502SP | Econet | Monthly disc/tape |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| First Byte | | | | | | | | | | | | | | |
| | Listing 1(a) | 105 | ● | ● | ● | ● | ● | | ● | ● | ● | ● | ● | ● |
| Tube Extensions | | | | | | | | | | | | | | |
| | Listing 1 | 106 | | | | | | | | | | ● | ● | ● |
| | Listing 2 | 108 | | | | | | | | | | ● | ● | ● |
| | Listing 3 | 109 | | | | | | | | | | ● | ● | ● |
| DIY Dumping | | | | | | | | | | | | | | |
| | Listing 1(b) | 110 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | Listing 2(b) | 111 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | Listing 3(b) | 111 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | Listing 4(b) | 112 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | Listing 5(b) | 113 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Mandelbrot Set | | | | | | | | | | | | | | |
| | Listing 1 | 114 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | Listing 2 | 114 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | Listing 3 | 115 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Crabb | | | | | | | | | | | | | | |
| | Listing 1 | | ● | ● | ● | | | | ● | ● | | ● | ● | ● |

*(a) requires disc* *(b) requires printer*

### Entering listings

*Where possible, programs are listed with line numbers in increments of 10 so type AUTO <RETURN> for automatic line numbering before you start. Don't type a space after the line number. To list your program so it appears identical to the printed version in the magazine, type:*

*LISTO 1<RETURN> WIDTH 40 <RETURN> LIST <RETURN>*

*With screen modes 1,4,6 or 7, WIDTH 40 is not needed. Occasionally, for clarity, programs are listed with a text width different to 40 characters.*

*Typing errors in Basic will usually cause error messages when the program is run. Finding errors in assembly language listings can be harder so we provide small, checking routines (called 'checksums') where possible.*

*All the Yellow Pages listings will work with Basic 1, 2 and 4 (unless stated otherwise) and with operating system OS1.2 or later operating systems.*

*Great care is taken to ensure the listings printed are correct but turn to Blunder box (page 17) to check if any errors were made in the previous issue.*

First Byte, see page 54

**Listing 1. A tape-to-disc transfer program. NB: this listing is dumped with WIDTH =41**

```
   10 REM Tape-to-disc transfer program
   20 REM by Tessie Revivis
   30 REM for B/B+/M/E
   40 REM (c) Acorn User May 1986
   50 :
   60 MODE 7
   70 space%=(HIMEM-TOP-512) AND &FF00
   80 DIM oscli% 40, mem% space%
   90 PROCcentre(2,"Tape-to-disc transfer
")
  100 PROCcentre(5,"Rewind your tape to t
he start,")
  110 PROCcentre(7,"press PLAY on your ta
pe machine")
  120 PROCcentre(9,"then press any key.")
  130 *FX 15
  140 *MOTOR 1
  150 any=GET
  160 CLS
  170 PROCcentre(2,"Transferring programs
 now...")
  180 VDU 28,0,8,39,6
  190 ON ERROR PROCerror:END
  200 REPEAT
  210 CLS
  220 *TAPE
  230 *OPT 1,2
  240 PROCoscli("LOAD """" "+STR$~mem%)
  250 i$=""
```

Continued ▶

◀ Continued

```
  260 PRINTTAB(0,1);
  270 FOR char=0 TO 39
  280 i$=i$+CHR$(FNreadchar)
  290 VDU 32
  300 NEXT char
  310 *DISC
  320 PROCoscli("SAVE "+LEFT$(i$,7)+" "+S
TR$~mem%+" +"+MID$(i$,15,4))
  330 UNTIL FALSE
  340 :
  350 DEF FNreadchar
  360 A%=135:X%=0:Y%=0
  370 =(USR(&FFF4) AND &FF00)/256
  380 :
  390 DEF PROCoscli($oscli%)
  400 X%=oscli%:Y%=oscli% DIV 256
  410 CALL &FFF7
  420 ENDPROC
  430 :
  440 DEF PROCcentre(y,t$)
  450 PRINTTAB(20-LENt$/2,y)t$
  460 ENDPROC
  470 :
  480 DEF PROCerror
  490 *DISC
  500 *OPT
  510 VDU 26,12
  520 PROCcentre(2,"Transfer aborted")
  530 IF ERR<>17 PRINTTAB(10,10);:REPORT:
PRINT" at line ";ERL
  540 ENDPROC
```

## How to enter It's Quicker by Tube

*Martin Chaplin presents three listings in this month's yellow pages. Listings 1 and 2 assemble two machine code routines; one to sit in the second processor and the other to live in the input/output processor on the main board. Listing 3 tests the extended facilities provided by listings 1 and 2.*

*Listing 1 assembles the code intended for the second processor. Make sure that you are using HiBasic when running this listing. Because listing 1 contains a lot of assembly language a checksum routine has been included (lines 2330 to 2370). Any errors found will be reported with a message prompting you to check your listing. The assembled code is saved at line 2380 with the filename M.X_HIBAS.*

*If you have made a typing error while entering listing 1 then ensure that after you have corrected your mistakes you save the new version. Before running listing 1 again you should press the Break key and either type OLD <Return> or load the corrected version back in.*

*Listing 2 assembles the machine code routine which lives in the main BBC micro. It can be run using Basic 2 or HiBasic. Again, a checksum routine has been included (lines 1460 to 1500) to detect any typing errors made. The finished code is saved with the filename M.IOTUBE at line 1510.*

*To implement the enhanced version of HiBasic, the following steps should be taken:*

1. *Reset machine by pressing CTRL-Break.*
2. *Load HiBasic if it is not resident in the machine.*
3. *Check that HiBasic is operating correctly by typing:*
   *PRINT ~ HIMEM*

*The value printed should be &B800.*

4. *Set up the BBC micro end by typing:*
   **RUN M.IOTUBE*
5. *Set up the second processor end by typing:*
   **RUN M.X_HIBAS*

*The extended facilities are now available for use. You can now enter listing 3 to test the extended HiBasic. Note, though, that listing 3 makes use of the new keyword 'TUBE' and so must only be entered once extended HiBasic has been installed. Running listing 3 will take you through a demonstration of the new commands.*

## Points to watch

*Net or ADFS users should note that directories 'A' and 'M' are used and these should be created using *CDIR beforehand to avoid a 'not found' error.*

*The code M.IOTUBE should not be *RUN more than once without pressing the Break key, since it intercepts the OSBYTE vector.*

**Listing 1. A program to set up the second processor at both ends of the Tube**

```
   10 REM Tube Extensions - 6502SP end
   20 REM by Martin Chaplin
   30 REM for BBC B/B+ with 6502SP
   40 REM (c) Acorn User May 1986
   50 :
   60 REM Run in 2nd processor using
   70 REM HIBASIC
   80 :
   90 HIMEM=HIMEM-&10F
  100 PROCconstants
  110 PROCassemble
  120 PROCsave
  130 END
  140 :
  150 DEF PROCconstants
  160 tubestatus=&FEFA
  170 tubedata=&FEFB
  180 buffer=&50
  190 direction=buffer
  200 motherboard=buffer+1
  210 osbytecode=buffer+3
  220 transferbytes=buffer+4
  230 reason=buffer+6
  240 satellite=buffer+7
  250 offset=&A
  260 pointer=&B
  270 lowbyte=&2A
  280 highbyte=&2B
  290 thirdbyte=&2C
  300 evaluate=&C043
  310 coldstart=&C2F8
  320 nextbyte=&C2B6
  330 hibasic=&C3B3
  340 ENDPROC
  350 :
  360 DEF PROCassemble
  370 FOR pass=0 TO 3 STEP 3
  380 P%=HIMEM
  390 [OPT pass
  400 .tokenspace
  410 LDA #&EC
  420 STA &203
  430 CLI
  440 JMP coldstart
  450 .action
  460 INY
  470 LDA (pointer),Y
  480 CMP #&A5
  490 BEQ tubeget
  500 CMP #ASC("G")
  510 BEQ tubeget
  520 CMP #ASC("P")
  530 BNE tuberror
  540 LDA #&FF
  550 BNE always
  560 .tubeget
  570 LDA #0
  580 .always
  590 STA direction
  600 .discard
  610 INY
  620 LDA (pointer),Y
  630 CMP #ASC("A")
  640 BCS discard
  650 .next
  660 STY offset
  670 JSR evaluate
  680 LDA lowbyte
  690 STA motherboard
```

Continued ▶

◀ Chaplin's listing 1 continued

```
700 LDA highbyte
710 STA motherboard+1
720 JSR nextbyte
730 CMP #ASC(",")
740 BEQ comma
750 .tuberror
760 BRK
770 EQUB &60
780 EQUB &CE
790 EQUB &20
800 EQUB &85
810 BRK
820 .comma
830 JSR evaluate
840 LDA lowbyte
850 STA satellite
860 LDA highbyte
870 STA satellite+1
880 JSR nextbyte
890 CMP #ASC(",")
900 BNE tuberror
910 JSR evaluate
920 LDA lowbyte
930 STA transferbytes
940 LDA highbyte
950 STA transferbytes+1
960 .standalone
970 LDA #&A4
980 STA osbytecode
990 LDY #6
1000 STY reason
1010 .sendparams
1020 LDA buffer,Y
1030 .wait
1040 BIT tubestatus
1050 BVC wait
1060 STA tubedata
1070 DEY
1080 BPL sendparams
1090 LDA direction
1100 BPL get
1110 .put
1120 LDY #0
1130 LDX transferbytes+1
1140 BEQ lp
1150 .hiloop
1160 LDA (satellite),Y
1170 .waitagain
1180 BIT tubestatus
1190 BVC waitagain
1200 STA tubedata
1210 INY
1220 BNE hiloop
1230 INC satellite+1
1240 DEX
1250 BNE hiloop
1260 .lp
1270 LDX transferbytes
1280 BEQ out
1290 .loop
1300 LDA (satellite),Y
1310 .waitrep
1320 BIT tubestatus
1330 BVC waitrep
1340 STA tubedata
1350 INY
1360 CPY transferbytes
1370 BNE loop
1380 .out
1390 JMP hibasic
1400 .get
```

Continued ▶

◀ Continued

```
1410 LDY #0
1420 LDX transferbytes+1
1430 BEQ lop
1440 .hilooprep
1450 BIT tubestatus
1460 BPL hilooprep
1470 LDA tubedata
1480 STA (satellite),Y
1490 INY
1500 BNE hilooprep
1510 INC satellite+1
1520 DEX
1530 BNE hilooprep
1540 .lop
1550 LDX transferbytes
1560 BEQ out
1570 .lopp
1580 BIT tubestatus
1590 BPL lopp
1600 LDA tubedata
1610 STA (satellite),Y
1620 INY
1630 CPY transferbytes
1640 BNE lopp
1650 BEQ out
1660 .call
1670 PHA
1680 PHP
1690 LDA thirdbyte
1700 CMP #&FF
1710 BEQ newcall
1720 PLP
1730 PLA
1740 JMP (lowbyte)
1750 .newcall
1760 LDA #6
1770 JSR send
1780 TYA
1790 JSR send
1800 TXA
1810 JSR send
1820 LDA #&A4
1830 JSR send
1840 LDA highbyte
1850 JSR send
1860 LDA lowbyte
1870 JSR send
1880 LDA #1
1890 JSR send
1900 PLA
1910 JSR send
1920 PLA
1930 .send
1940 BIT tubestatus
1950 BVC send
1960 STA tubedata
1970 RTS
1980 ]
1990 NEXT pass
2000 FOR X%=&B871 TO &BB31
2010 X%?-6=?X%
2020 NEXT X%
2030 ?&C210=&6B
2040 ?&ED19=&6B
2050 ?&BBB4=action MOD 256
2060 ?&BC26=action DIV 256
2070 ?&C3C9=&CE
2080 FOR pass=0 TO 3 STEP 3
2090 P%=&BB2C
2100 [OPT pass
2110 EQUS"TUBE"
```

Continued ▶

◀ **Chaplin's listing 1 continued**

```
2120 EQUB &CE
2130 EQUB &2
2140 ]
2150 P%=&B868
2160 [OPT pass
2170 JMP tokenspace
2180 ]
2190 P%=&C746
2200 [OPT pass
2210 JMP call
2220 ]
2230 P%=&B823
2240 [OPT pass
2250 NOP
2260 LDX #HIMEM MOD 256
2270 LDY #HIMEM DIV 256
2280 ]
2290 NEXT pass
2300 ENDPROC
2310 :
2320 DEF PROCsave
2330 LOCAL sum%
2340 FOR X%=HIMEM TO &F7FF STEP4
2350 sum%=sum%+!X%
2360 NEXT X%
2370 IF sum%<>&A5B5F2CD PRINT"Check for
possible assembly error"
2380 OSCLI"SAVE M.X_HIBAS "+STR$~HIMEM+
" F800 B800"
2390 ENDPROC
```

**Listing 2. A program to set up the BBC at both ends of the Tube**

```
10 REM Tube Extensions - BBC end
20 REM by Martin Chaplin
30 REM for BBC B/B+ with 6502SP
40 REM (c) Acorn User May 1986
50 :
60 REM Run in 6502 2nd processor
70 REM using BASIC2 or HIBASIC
80 :
90 PROCconstants
100 PROCassemble
110 PROCsave
120 END
130 :
140 DEF PROCconstants
150 start%=&1F00
160 tubestatus=&FEE2
170 tubedata=&FEE3
180 romid=&F4
190 latch=&FE30
200 buffer=&60
210 direction=buffer
220 motherboard=buffer+1
230 bytestransfer=buffer+3
240 bytev=&20A
250 ENDPROC
260 :
270 DEF PROCassemble
280 FOR pass=0 TO 3 STEP 3
290 P%=start%
300 [OPT pass
310 LDA bytev
320 STA oldbytev+1
330 LDA bytev+1
```

**Continued** ▶

◀ **Continued**

```
340 STA oldbytev+2
350 LDA #tube MOD 256
360 STA bytev
370 LDA #tube DIV 256
380 STA bytev+1
390 RTS
400 .fxout
410 CPX #1
420 BNE outfx
430 STY romid
440 STY latch
450 .outfx
460 LDA #130
470 .oldbytev
480 JMP &0000
490 .tube
500 CMP #&A4
510 BNE oldbytev
520 STY bytestransfer
530 STX bytestransfer+1
540 BIT tubestatus
550 BPL fxout
560 PLA
570 PLA
580 LDA #0
590 PHA
600 LDA #&36
610 PHA
620 LDX #2
630 .receive
640 BIT tubestatus
650 BPL receive
660 LDA tubedata
670 STA buffer,X
680 DEX
690 BPL receive
700 LDA direction
710 BEQ get
720 BPL call
730 .put
740 LDY #0
750 LDX bytestransfer+1
760 BEQ loloop
770 .hiloop
780 BIT tubestatus
790 BPL hiloop
800 LDA tubedata
810 STA (motherboard),Y
820 INY
830 BNE hiloop
840 INC motherboard+1
850 DEX
860 BNE hiloop
870 .loloop
880 LDX bytestransfer
890 BEQ out
900 .loop
910 BIT tubestatus
920 BPL loop
930 LDA tubedata
940 STA (motherboard),Y
950 INY
960 CPY bytestransfer
970 BNE loop
980 .out
990 RTS
1000 .get LDY#0
1010 LDX bytestransfer+1
1020 BEQ lolp
```

**Continued** ▶

◀ **Chaplin's listing 2 continued**

```
 1030 .hilp
 1040 LDA (motherboard),Y
 1050 .send
 1060 BIT tubestatus
 1070 BVC send
 1080 STA tubedata
 1090 INY
 1100 BNE hilp
 1110 INC motherboard+1
 1120 DEX
 1130 BNE hilp
 1140 .lolp
 1150 LDX bytestransfer
 1160 BEQ out
 1170 .lolop
 1180 LDA (motherboard),Y
 1190 .sending
 1200 BIT tubestatus
 1210 BVC sending
 1220 STA tubedata
 1230 INY
 1240 CPY bytestransfer
 1250 BNE lolop
 1260 RTS
 1270 .call
 1280 LDX buffer+3
 1290 LDY buffer+4
 1300 .rec
 1310 BIT tubestatus
 1320 BPL rec
 1330 LDA tubedata
 1340 PHA
 1350 PLP
 1360 .gather
 1370 BIT tubestatus
 1380 BPL gather
 1390 LDA tubedata
 1400 JMP (motherboard)
 1410 ]
 1420 NEXT pass
 1430 ENDPROC
 1440 :
 1450 DEF PROCsave
 1460 LOCAL sum%
 1470 FOR X%=start% TO P%-1
 1480 sum%=sum%+?X%
 1490 NEXT X%
 1500 IF sum%<>&6BA6 PRINT"Check for pos
ible assembly error"
 1510 OSCLI"SAVE M.IOTUBE "+STR$~start%+
" "+STR$~P%+" FFFF"+STR$~start%+" FFFF"+
STR$~start%
 1520 ENDPROC
```

**Listing 3. A test for both listings 1 and 2**

```
   10 REM Tube Extensions Test
   20 REM by Martin Chaplin
   30 REM for BBC B/B+ with 6502SP
   40 REM (c) Acorn User May 1986
   50 :
   60 REM Runs in 6502 2nd processeor
   70 :
   80 ON ERROR GOTO 1180
   90 MODE 1
  100 COLOUR 2
  110 PRINT"Please wait"
```

**Continued** ▶

◀ **Continued**

```
  120 FOR X%=&6200 TO &B1FF STEP 4
  130 !X%=&A5A5A5A5
  140 NEXT X%
  150 PRINT"Test new FX call, *FX164,";
  160 PRINT" which checks"
  170 PRINT"that the TUBE software is";
  180 PRINT" at the other"
  190 PRINT"end of the TUBE"
  200 GCOL 0,129
  210 VDU 24,150;200;1130;750;
  220 CLG
  230 *FX 164
  240 PRINT"*FX164 OK"
  250 PROCpause
  260 TUBEGET &3000,&1200,&5000
  270 TUBEPUT &3000,&6200,&5000
  280 PRINT'"TUBEGET &3000,&1200,&5000"
  290 PRINT"Gets &5000 bytes from";
  300 PRINT" Input/Output"
  310 PRINT"motherboard and puts";
  320 PRINT" them from &1200 to"
  330 PRINT"&6200 in the 2nd processor"
  340 PRINT'"TUBEPUT &3000,&6200,&5000"
  350 PRINT"Puts  &5000 bytes from";
  360 PRINT" 2nd processor at"
  370 PRINT"&6200-&B200 into screen";
  380 PRINT" memory (&3000-"
  390 PRINT"&8000) in motherboard"
  400 PROCpause
  410 CLS
  420 PRINT"More code"
  430 FOR X%=0 TO 3 STEP 3
  440 P%=&2800
  450 [OPT X%
  460 LDA #0
  470 STA &2870
  480 LDA #&29
  490 STA &2871
  500 JMP (&2870)
  510 ]
  520 P%=&2900
  530 [OPT X%
  540 STA &1900
  550 STX &1901
  560 STY &1902
  570 PHP
  580 PLA
  590 STA &1903
  600 RTS
  610 ]
  620 NEXT
  630 PROCpause
  640 CLS
  650 PRINT"CALL&2800"
  660 PRINT"Checks out code"
  670 PRINT'"If OK it is followed by :"
  680 PRINT"TUBEPUT &2800,&2800,&5800"
  690 CALL &2800
  700 PROCpause
  710 TUBEPUT &2800,&2800,&5800
  720 REM Ensure no program at &2900
  730 ?&2900=0
  740 PROCpause
  750 CLS
  760 PRINT''"Check CALL extension"
  770 PRINT"A%=1:X%=2:Y%=3:C%=0:";
  780 PRINT"CALL &FF2900"
  790 A%=1
  800 X%=2
```

**Continued** ▶

◄ **Chaplin's listing 3 continued**

```
 810 Y%=3
 820 C%=0
 830 CALL &FF2900
 840 PROCpause
 850 PRINTTAB(0,5)"&1900 holds";
 860 PRINT" the A register"
 870 PRINT"&1902 holds the Y register"
 880 PRINT"&1903 holds the P register"
 890 PRINT'"~!&1900 in 2nd Proc";
 900 PRINT" = &";~!&1900
 910 TUBEGET&1900,&1900,&4
 920 PRINT"~!&1900 in IO Proc";
 930 PRINT"  = &";~!&1900
 940 A%=2
 950 X%=3
 960 Y%=1
 970 C%=&FF
 980 CALL &FF2900
 990 PRINT"A%=2:X%=3:Y%=1:C%=&FF:";
1000 PRINT"CALL &FF2900 AGAIN"
1010 TUBEGET &1900,&1900,&4
1020 PRINT"New ~!&1900 in IO Proc";
1030 PRINT" = &";~!&1900
1040 PROCpause
1050 TUBE
1060 PRINTTAB(3,20)"Test completed";
1070 PRINT" successfully"
1080 END
1090 :
1100 DEF PROCpause
1110 PRINTTAB(0,31)"Press a key";
1120 PRINT" to continue";
1130 REPEAT UNTIL GET
1140 PRINTTAB(0,31)STRING$(23," ");
1150 ENDPROC
1160 :
1170 REM Check error in Line 1050
1180 IF (ERR=&60) AND (ERL=1050) PRINTT
AB(0,16);:REPORT:PRINT":-Error message t
ested OK":GOTO 1060
1190 CLS
1200 PRINTTAB(5,5)"Test error"'''
1210 REPORT
1220 PRINT" @ Line No. ";ERL
1230 END
```

## How to enter DIY Dumping

*All five programs are straightforward. As the assembler in each is short a checksum has not been included. With the exception of the 'HtoV' listing all programs require an Epson or Epson compatible dot-matrix printer to work. Electron owners will obviously need to have the Plus 1 attached to be able to use a printer.*

*The CDUMP program is numbered from line 10000 onwards. This is deliberate as it is not a stand alone program but instead a procedure that can be spooled onto the end of a main program. After entering CDUMP save it as an ASCII spool file thus:*

**SPOOL CDUMP*
*LIST*
**SPOOL*

*The program will list to tape or disc.*

*The program 'SPLSCRN' tests CDUMP. Enter and save SPLSCRN. CDUMP can be appended to the end of SPLSCRN by performing,*

**EXEC CDUMP.*

*To use CDUMP you will need to insert an extra line at the point where you wish the character dump to take place. In the case of SPLSCRN place it as follows:*

*75 PROCcdump*

**Listing 1. Single characters are prompted from the screen and are printed out using their definitions**

```
 10 REM CHARPRT
 20 REM by George Hill
 30 REM B/B+/M/E with Plus 1
 40 REM (C) Acorn User May 1986
 50 :
 60 MODE 6
 70 ON ERROR PROCerror:END
 80 :
 90 PROCinitialise
100 REPEAT
110 PROCgetchar
120 CALL code
130 PROCprintit
140 UNTIL FALSE
150 END
160 :
170 DEF PROCinitialise
180 DIM code 47
190 osword=&FFF1
200 VDU 23,240,1,3,7,15,31,63,127,255
210 VDU 23,241,1,3,5,9,31,33,65,129
220 PROCassemble
230 VDU 2
240 ENDPROC
250 :
260 DEF PROCassemble
270 FOR pass=0 TO 2 STEP 2
280 P%=code
290 [OPT pass
300 .code
310 LDA #&0A
320 LDX #char MOD 256
330 LDY #char DIV 256
340 JSR osword
350 :
360 .htov
370 LDY #7
380 .loop1
390 LDX #7
400 .loop2
410 LDA cchar,Y
420 LSR A
430 STA cchar,Y
440 ROR pchar,X
450 DEX
460 BPL loop2
470 DEY
480 BPL loop1
490 RTS
500 ]
510 char=P%
520 cchar=P%+1
530 pchar=P%+9
540 NEXT
550 ENDPROC
560 :
570 DEF PROCgetchar
580 INPUT"Type a character, or an ASCI
I code:"char$
590 ch=ASC(LEFT$(char$,1))
600 IF LEN(char$)>1 AND ch>47 AND ch<5
9 THEN ch=VAL(char$)
610 ?char=ch
620 ENDPROC
630 :
640 DEF PROCprintit
650 VDU 1,27,1,75,1,8,1,0
660 FOR index=0 TO 7
```

Continued ►

◀ Hill's listing 1 continued

```
670 VDU 1,pchar?index
680 NEXT
690 VDU 1,10
700 ENDPROC
710 :
720 DEF PROCerror
730 FOR N%=0 TO 40
740 VDU 1,127
750 NEXT
760 VDU 1,27,1,64,3,10,13
770 IF ERR<>17 THEN REPORT:PRINT" at l
ine ";ERL
780 ENDPROC
```

Listing 2. It reads a character and reproduces it exactly

```
10 REM TYPWRTR
20 REM by George Hill
30 REM B/B+/M/E with Plus 1
40 REM (C) Acorn User May 1986
50 REM PAGE=PAGE+&600
60 :
70 MODE 3
80 PROCinitialise
90 PRINT SPC(20);CHR$(240);" George's
 Typewriter Program ";CHR$(241)''
100 REPEAT
110 ?char=GET
120 IF ?char=13 THEN VDU 13:PROCprintl
ine ELSE VDU?char
130 IF POS=79 THEN VDU 7,8
140 UNTIL FALSE
150 END
160 :
170 DEF PROCinitialise
180 P$="The value of PAGE is too low t
o permit you to redefine the normal char
acters."+CHR$(10)+CHR$(13)+"Reset PAGE,
then reload program."
190 DIM code 107
200 oswrch=&FFEE
210 osbyte=&FFF4
220 osword=&FFF1
230 REM Check filing system
240 osargs=&FFDA
250 A%=0:X%=&70:Y%=0
260 F%=USRosargs MOD 256
270 IF (F%=1 OR F%=2 OR F%=3) AND PAGE
<(&E00+&600) THEN PRINT P$:STOP
280 IF F%=4 AND PAGE<(&1900+&600) THEN
 PRINT P$:STOP
290 IF (F%=5 OR F%=6) AND PAGE<(&1200+
&600) THEN PRINT P$:STOP
300 *FX20,6
310 PROCdefinechars
320 REM Initialise printer
330 VDU 2,1,27,1,64,3
340 PROCassemble
350 ENDPROC
360 :
370 DEF PROCprintline
380 VDU 2,1,27,1,76,1,128,1,2
390 FOR N%=1 TO 80
400 CALL code
410 VDU 3,9,2
420 NEXT
430 VDU 1,10,3
```

Continued ▶

◀ Continued

```
440 ENDPROC
450 :
460 DEF PROCassemble
470 FOR pass=0 TO 2 STEP 2
480 P%=code
490 [OPT pass
500 .code
510 \read character
520 LDA #135
530 JSR osbyte
540 STX char
550 LDA #&0A
560 LDX #char MOD 256
570 LDY #char DIV 256
580 JSR osword
590 .htov
600 LDY #7
610 .loop1
620 LDX #7
630 .loop2
640 LDA cchar,Y
650 LSR A
660 STA cchar,Y
670 ROR pchar,X
680 DEX
690 BPL loop2
700 DEY
710 BPL loop1
720 \print character
730 LDX #0
740 .loop3
750 LDA #1
760 JSR oswrch
770 LDA pchar,X
780 JSR oswrch
790 INX
800 CPX #8
810 BNE loop3
820 RTS
830 ]
840 char=P%
850 cchar=P%+1
860 pchar=P%+9
870 NEXT
880 ENDPROC
890 :
900 DEF PROCdefinechars
910 REM Redefine what you like here.
920 VDU 23,240,1,3,7,15,31,63,127,255
930 VDU 23,241,&80,&C0,&E0,&F0,&F8,&FC
,&FE,&FF
940 VDU 23,65,1,5,9,17,63,65,129,0
950 ENDPROC
```

Listing 3. Dumping procedure to let you print user-defined characters when dumping a screen one character at a time

```
10000 REM CDUMP
10010 REM by George Hill
10020 REM B/B+/M/E with Plus 1
10030 REM (C) Acorn User May 1986
10040 REM Must be merged with a
10050 REM dumping program - see notes
10060 :
10070 DEF PROCcdump
10080 DIM code 48
```

Continued ▶

◀ **Hill's listing 3 continued**

```
10090 osword=&FFF1
10100 osbyte=&FFF4
10110 PROCassemble
10120 PROCreadparameters
10130 PROCdump
10140 ENDPROC
10150 :
10160 DEF PROCassemble
10170 FOR pass=0 TO 2 STEP 2
10180 P%=code
10190 [OPT pass
10200 .code
10210 LDA #&0A
10220 LDX #char MOD 256
10230 LDY #char DIV 256
10240 JSR osword
10250 :
10260 .htov
10270 LDY #7
10280 .loop1
10290 LDX #7
10300 .loop2
10310 LDA cchar,Y
10320 LSR A
10330 STA cchar,Y
10340 ROR pchar,X
10350 DEX
10360 BPL loop2
10370 DEY
10380 BPL loop1
10390 RTS
10400 ]
10410 user=P%
10420 char=P%+1
10430 cchar=P%+2
10440 pchar=P%+10
10450 NEXT
10460 ENDPROC
10470 :
10480 DEF PROCdump
10490 VDU 26,2
10500 VDU 1,27,1,65,1,linefeed
10510 FOR Y%=1 TO linesperpage
10520 VDU 1,27,1,density,1,n1,1,n2
10530 FOR X%=1 TO charsperline
10540 !user=USR osbyte
10550 CALL code
10560 FOR N%=0 TO 7
10570 VDU 1,N%?pchar
10580 IF twofive THEN VDU 1,N%?pchar
10590 NEXT
10600 VDU 3,9,2
10610 NEXT
10620 VDU 1,10
10630 NEXT
10640 VDU 1,12,1,27,1,64,3
10650 ENDPROC
10660 :
10670 DEF PROCreadparameters
10680 A%=135
10690 !user=USR osbyte
10700 mode=user?2
10710 RESTORE 10800
10720 FOR N%=0 TO mode
10730 READ linefeed,linesperpage,charspe
rline,density,n1,n2,twofive
10740 NEXT
10750 ENDPROC
10760 :
```

**Continued** ▶

◀ **Continued**

```
10770 REM DATA contains 7 parameters,
10780 REM one line per Mode.
10790 :
10800 DATA 8,32,80,76,128,2,0
10810 DATA 8,32,40,75,64,1,0
10820 DATA 8,32,20,75,64,1,-1
10830 DATA 10,25,80,76,128,2,0
10840 DATA 8,32,40,75,64,1,0
10850 DATA 8,32,20,75,64,1,-1
10860 DATA 10,25,40,75,64,1,0
10870 DATA 10,25,40,75,64,1,0
```

**Listing 4. Sample-screen for dumping with CDUMP**

```
10 REM SPLSCRN - to test CDUMP
20 REM by George Hill
30 REM B/B+/M/E with Plus 1
40 REM (C) Acorn User May 1986
50 :
60 PROCinitialise
70 PROCsample
80 END
90 :
100 DEF PROCinitialise
110 DIM scruser 3
120 osbyte=&FFF4
130 PROCread
140 VDU 26,12
150 ENDPROC
160 :
170 DEF PROCsample
180 VDU 23,240,1,3,7,15,31,63,127,255
190 VDU 23,241,&80,&C0,&E0,&F0,&F8,&FC,
&FE,&FF
200 VDU 23,242,255,129,129,129,129,129,
129,255
210 VDU 23,243,1,3,5,9,17,33,65,129,255
220 VDU 23,244,1,1,1,1,1,1,1,1
230 VDU 23,245,128,128,128,128,128,128,
128,128
240 VDU 23,246,8,28,28,107,127,107,8,28
250 VDU 23,247,8,28,62,127,62,28,8,0
260 VDU 23,248,54,127,127,127,62,28,8,0
270 VDU 23,249,8,28,62,127,127,127,28,6
2
280 PRINTTAB(charsperline/2-8,0);CHR$(2
40);"SAMPLE SCREEN";CHR$(241)
290 FOR N%=1 TO linesperpage-2
300 PRINT CHR$(244);CHR$(32);
310 FOR J%=0 TO charsperline DIV 2-4
320 PRINT CHR$(32);CHR$(246+J% MOD 4);
330 NEXT
340 PRINT CHR$(32);CHR$(32);CHR$(245)
350 NEXT
360 PRINTTAB(charsperline/2-8,linesperp
age-1);"BOTTOM LINE";CHR$(242);CHR$(243);
370 ENDPROC
380 :
390 DEF PROCread
400 A%=135
410 !scruser=USR osbyte
420 mode=scruser?2
430 RESTORE 490
440 FOR N%=0 TO mode
450 READ linefeed,linesperpage,charsper
line,density,n1,n2,twofive
```

**Continued** ▶

◀ Hill's listing 4 continued

```
460 NEXT
470 ENDPROC
480 :
490 DATA 8,32,80,76,128,2,0
500 DATA 8,32,40,75,64,1,0
510 DATA 8,32,20,75,64,1,-1
520 DATA 10,25,80,76,128,2,0
530 DATA 8,32,40,75,64,1,0
540 DATA 8,32,20,75,64,1,-1
550 DATA 10,25,40,75,64,1,0
560 DATA 10,25,40,75,64,1,0
```

Listing 5. Illustrates how the bit-by-bit conversion is carried out

```
10 REM HtoV
20 REM by George Hill
30 REM B/B+/M/E
40 REM (C) Acorn User May 1986
50 :
60 MODE 1
70 VDU 23,1,0;0;0;0;
80 PROCconstants
90 PROCheadings
100 PROCgrids
110 PROCdisplays
120 PROCspin
130 VDU 17,3,31,0,31,23,1,1;0;0;0;
140 END
150 :
160 DEF PROCconstants
170 delay%=1000
180 null$="Z"
190 A1X=3:A1Y=2
200 A2X=23:A2Y=13
210 ACX=23:ACY=2
220 G1X=32*A1X-16
230 G1Y=32*(32-A1Y)-496
240 G2X=32*A2X-16
250 G2Y=32*(32-A2Y)-496
260 GCX=32*ACX-16
270 GCY=32*(32-ACY)-48
280 DIM bit1$(7,7),bit2$(7,7)
290 DIM hpos(7,7),vpos(7,7)
300 FOR N%=0 TO 7
310 FOR J%=0 TO 7
320 bit1$(N%,J%)=STR$(RND(2)-1)
330 bit2$(N%,J%)=null$
340 hpos(N%,J%)=2*J%
350 vpos(N%,J%)=2*N%
360 NEXT
370 NEXT
380 carry$=null$
390 ENDPROC
400 :
410 DEF PROCgrids
420 PROCgrid(G1X,G1Y,FALSE)
430 PROCgrid(G2X,G2Y,TRUE)
440 ENDPROC
450 :
460 DEF PROCdisplays
470 COLOUR 2
480 PROCdisplayarray(A1X,A1Y,FALSE)
490 PROCdisplayarray(A2X,A2Y,TRUE)
500 PROCcarry(GCX,GCY)
510 ENDPROC
```

Continued ▶

◀ Continued

```
520 :
530 DEF PROCgrid(XL,YL,two)
540 LOCAL m,n
550 IF two THEN m=21:n=5 ELSE m=5:n=21
560 XH=XL+32*16
570 YH=YL+32*16
580 FOR X=XL TO XH STEP 64
590 MOVE X,YL
600 PLOT n,X,YH
610 NEXT
620 FOR Y=YL TO YH STEP 64
630 MOVE XL,Y
640 PLOT m,XH,Y
650 NEXT
660 ENDPROC
670 :
680 DEF PROCdisplayarray(XL,YL,array)
690 FOR N%=0 TO 7
700 FOR J%=0 TO 7
710 PRINTTAB(hpos(N%,J%)+XL,vpos(N%,J%
)+YL);
720 IF array THEN PRINTbit2$(N%,J%); E
LSE PRINTbit1$(N%,J%);
730 NEXT
740 NEXT
750 ENDPROC
760 :
770 DEF PROCcarry(X,Y)
780 MOVE X,Y
790 DRAW X+64,Y
800 DRAW X+64,Y+64
810 DRAW X,Y+64
820 DRAW X,Y
830 PRINTTAB(ACX,ACY);carry$;
840 ENDPROC
850 :
860 DEFPROCspin
870 Z%=INKEY(delay%)
880 FOR N%=7 TO 0 STEP -1
890 H1X=G1X+64*8+4
891 H1Y=G1Y+32
900 H2X=G2X+64*8-32
901 H2Y=G2Y+64*8+64
910 GCOL 0,0
920 MOVE H1X,H1Y+64*(6-N%)
930 DRAW H1X+60,H1Y+64*(6-N%)
940 DRAW H1X+60,GCY+32
950 GCOL 0,3
960 MOVE H1X,H1Y+64*(7-N%)
970 DRAW H1X+60,H1Y+64*(7-N%)
980 DRAW H1X+60,GCY+32
990 DRAW GCX,GCY+32
1000 MOVE GCX+64,GCY+32
1010 DRAW H2X,GCY+32
1020 DRAW H2X,H2Y
1030 FOR J%=0 TO 7
1040 lastJ=(J%+7) MOD 8
1050 Z%=INKEY(delay%)
1060 *FX15
1070 GCOL0,0
1080 MOVE H2X,H2Y
1081 DRAW H2X-64*8,H2Y
1090 PROCarrow(G2X+32+64*lastJ,G2Y+32*1
8)
1100 GCOL 0,3
1110 MOVE H2X,H2Y
1120 DRAW H2X-64*(7-J%),H2Y
1130 PROCarrow(G2X+32+64*J%,G2Y+32*18)
1140 carry$=bit1$(N%,7)
```

Continued ▶

◄ Hill's listing 5 continued

```
1150 FOR K%=0 TO 6
1160 bit1$(N%,7-K%)=bit1$(N%,6-K%)
1170 NEXT
1180 bit1$(N%,0)=null$
1190 FOR K%=0 TO 7
1200 PRINTTAB(hpos(N%,K%)+A1X,vpos(N%,K
%)+A1Y);bit1$(N%,K%);
1210 NEXT
1220 PRINTTAB(ACX,ACY);carry$;
1230 Z%=INKEY(delay%)
1240 *FX15
1250 FOR K%=0 TO 6
1260 bit2$(7-K%,J%)=bit2$(6-K%,J%)
1270 NEXT
1280 bit2$(0,J%)=carry$
1290 carry$=null$
1300 FOR K%=0 TO 7
1310 PRINTTAB(hpos(K%,J%)+A2X,vpos(K%,J
%)+A2Y);bit2$(K%,J%);
1320 NEXT
1330 PRINTTAB(ACX,ACY);carry$;
1340 NEXT
1350 NEXT
1360 ENDPROC
1370 :
1380 DEF PROCheadings
1390 COLOUR 1
1400 PRINTTAB(A1X,A1Y-2);"Character Byt
es";
1410 PRINTTAB(A2X+1,A2Y+18);"Printer By
tes";
1420 PRINTTAB(ACX-2,ACY-2);"Carry"TAB(A
CX-1,ACY+2);"bit";
1430 FOR N%=0 TO 7
1440 PRINTTAB(A2X+2*N%,A2Y+16);7-N%;
1450 PRINTTAB(A1X-2,A1Y+N%*2);N%;
1460 NEXT
1470 ENDPROC
1480 :
1490 DEF PROCarrow(X,Y)
1500 MOVE X,Y
1510 DRAW X,Y-60
1520 DRAW X-8,Y-52
1521 MOVE X+8,Y-52
1522 DRAW X,Y-60
1530 ENDPROC
```

## Join the Mandelbrot Set, see page 80

**Listing 2. Generates Mandelbrot graphics**

```
10 REM MANDEL1
20 REM by David Johnson-Davies
30 REM B/B+/M/E
40 REM (C) Acorn User May 1986
50 :
60 maxcol%=7
70 MODE 2
80 S%=255
90 DIM C%(S%)
100 VDU 28,16,31,19,0
110 INPUT "x,y:" j,k
120 INPUT "  s:" q
130 var=maxcol%/LOG(S%)
140 FOR N%=1TO S%
150 C%(N%)=maxcol%-INT(LOG(N%)*var)
160 NEXT
```

Continued ►

◄ Continued

```
170 VDU 19,1,5;0;
180 VDU 19,2,4;0;
190 VDU 19,3,6;0;
200 VDU 19,4,2;0;
210 VDU 19,5,3;0;
220 VDU 19,6,1;0;
230 :
240 REM Main Loop
250 Q%=1024: M%=1
260 REPEAT
270 L=q/M%
280 H%=Q%/M%
290 FOR J%=0 TO M%-1
300 FOR K%=0 TO M%-1
310 IF K% MOD 2 OR J% MOD 2 PROCpt
320 NEXT:NEXT
330 M%=M%*2
340 PRINT M%
350 UNTIL M%=256
360 PRINT "END"
370 END
380 :
390 DEF FNm(u,v)
400 N%=-1:x=0:y=0
410 REPEAT
420 y2=y*y
430 x2=x*x
440 y=2*x*y+v
450 x=x2-y2+u
460 N%=N%+1
470 UNTIL N%=S% OR x2+y2>=4
480 =N%
490 :
500 DEF PROCpt
510 x=j+L*J%
520 y=k+L*K%
530 PROCgcol(C%(FNm(x,y)))
540 X%=J%*H%
550 Y%=K%*H%
560 MOVE X%,Y%
570 MOVE X%+H%-1,Y%
580 PLOT 85,X%,Y%+H%-1
590 PLOT 85,X%+H%-1,Y%+H%-1
600 ENDPROC
610 :
620 DEF PROCgcol(B%)
630 GCOL 0,B%
640 ENDPROC
650 :
660 DEF PROCgcol(B%)
670 D%=B% DIV 2
680 E%=(D%+B% MOD 2) MOD 8
690 VDU 23,12,D%,E%,E%,D%,D%,E%,E%,D%
700 GCOL 16,0
710 ENDPROC
```

**Listing 3. Creates a 4k disc file of Mandelbrot graphics data**

```
10 REM MANDEL2
20 REM by David Johnson-Davies
30 REM B/B+/M/E
40 REM (C) Acorn User May 1986
50 :
60 INPUT"File:"A$
70 file=OPENOUT A$
80 INPUT "x,y:" j,k
90 INPUT "  s:" Q%
100 S%=255
```

Continued ►

◀ **Johnson-Davis's listing 3 continued**

```
110 H=Q%/128
120 FOR J%=0 TO 127
130 FOR K%=0 TO 127
140 u=j+H*J%
150 v=k+H*K%
160 N%=-1:x=0:y=0
170 REPEAT
180 y2=y*y
190 x2=x*x
200 y=2*x*y+v
210 x=x2-y2+u
220 N%=N%+1
230 UNTIL N%=S% OR x2+y2>=4
240 BPUT #file,N%
250 NEXT
260 PRINT J%
270 NEXT
280 CLOSE#file
290 PRINT "END"
300 END
```

**Listing 4. Reads the data file created by listing 3, processes the point and plots the result**

```
10 REM MANDEL3
20 REM by David Johnson-Davies
30 REM B/B+/M/E
40 REM (C) Acorn User May 1986
50 :
60 maxcol%=7
70 DIM C%(255)
80 FOR N%=0 TO 255
90 C%(N%)=0
100 NEXT
110 :
120 INPUT"File:"A$
130 file=OPENIN A$
140 FOR N%=1TO 128*128
150 B%=BGET#file
160 C%(B%)=C%(B%)+1
170 NEXT
180 :
190 max=(128*128-C%(255))/maxcol%
200 C%(255)=0
210 J%=maxcol%
220 T%=0
230 FOR N%=0 TO 254
240 T%=T%+C%(N%)
250 C%(N%)=J%
260 IF T%>=max*(maxcol%-J%+1) J%=J%-1:
 IF J%<1 J%=1
270 NEXT
280 :
290 REM Plot Points
300 MODE 2
310 VDU 28,16,31,19,0
320 VDU 19,1,5;0;
330 VDU 19,2,4;0;
340 VDU 19,3,6;0;
350 VDU 19,4,2;0;
360 VDU 19,5,3;0;
370 VDU 19,6,1;0;
380 H%=8
390 PTR#file=0
400 FOR J%=0 TO 127
410 FOR K%=0 TO 127
420 B%=C%(BGET#file)
```

**Continued ▶**

◀ **Continued**

```
430 PROCgcol(B%)
440 X%=J%*H%
450 Y%=K%*H%
460 MOVE X%,Y%
470 PLOT 1,0,H%-1
480 NEXT
490 NEXT
500 END
510 :
520 DEF PROCgcol(B%)
530 GCOL 0,B%
540 ENDPROC
550 :
560 DEF PROCgcol(B%)
570 D%=B% DIV 2
580 E%=(D%+B% MOD 2) MOD 8
590 VDU 23,12,D%,E%,E%,D%,D%,E%,E%,D%
600 GCOL 16,0
610 ENDPROC
```

## Checksums

*David Johnson-Davies listings 1 and 2 (Mandel 1 and 2) provides this month's checksums. Numerous variables are used in the programs so it is possible that you could enter one of these incorrectly thus inhibiting the program's action. If you cannot trace the error 'manually' then use the checksum. You will need the BSUM program provided in First Byte of August 1985 or use the *CHECK command present on the* Acorn User *UserROM (see page 102).*

**Mandel 1 checksum**

| Line | Checksum |
|---|---|
| 10 | 771 |
| 20 | 2460 |
| 30 | 752 |
| 40 | 2006 |
| 50 | 63 |
| 60 | 810 |
| 70 | 324 |
| 80 | 347 |
| 90 | 571 |
| 100 | 929 |
| 110 | 980 |
| 120 | 728 |
| 130 | 1511 |
| 140 | 834 |
| 150 | 2105 |
| 160 | 242 |
| 170 | 748 |
| 180 | 748 |
| 190 | 751 |
| 200 | 748 |
| 210 | 750 |
| 220 | 749 |
| 230 | 63 |
| 240 | 1122 |
| 250 | 709 |
| 260 | 250 |
| 270 | 421 |
| 280 | 461 |
| 290 | 952 |
| 300 | 953 |
| 310 | 1699 |

**Continued ▶**

# TOP OF THE LIST

**by Alan Crabb**

**◀ Mandel 1 continued**

| Line | Checksum |
|---|---|
| 320 | 539 |
| 330 | 392 |
| 340 | 395 |
| 350 | 629 |
| 360 | 567 |
| 370 | 229 |
| 380 | 63 |
| 390 | 899 |
| 400 | 862 |
| 410 | 250 |
| 420 | 526 |
| 430 | 523 |
| 440 | 731 |
| 450 | 740 |
| 460 | 394 |
| 470 | 1358 |
| 480 | 183 |
| 490 | 63 |
| 500 | 732 |
| 510 | 571 |
| 520 | 574 |
| 530 | 1590 |
| 540 | 460 |
| 550 | 462 |
| 560 | 574 |
| 570 | 825 |
| 580 | 985 |
| 590 | 1236 |
| 600 | 230 |
| 610 | 63 |
| 620 | 1115 |
| 630 | 467 |
| 640 | 230 |
| 650 | 63 |
| 660 | 1115 |
| 670 | 525 |
| 680 | 1017 |
| 690 | 1746 |
| 700 | 467 |
| 710 | 230 |

**Mandel 2 checksum**

| Line | Checksum | Line | Checksum |
|---|---|---|---|
| 10 | 772 | 200 | 731 |
| 20 | 2460 | 210 | 740 |
| 30 | 752 | 220 | 394 |
| 40 | 2006 | 230 | 1358 |
| 50 | 63 | 240 | 869 |
| 60 | 857 | 250 | 242 |
| 70 | 797 | 260 | 392 |
| 80 | 980 | 270 | 242 |
| 90 | 734 | 280 | 678 |
| 100 | 347 | 290 | 567 |
| 110 | 465 | 300 | 229 |
| 120 | 897 | | |
| 130 | 898 | | |
| 140 | 564 | | |
| 150 | 567 | | |
| 160 | 862 | | |
| 170 | 250 | | |
| 180 | 526 | | |
| 190 | 523 | | |

## Electron Keys

*Entering Basic programs on the Electron can be a much quicker process because of its single key entry facility. By pressing a combination of keys a corresponding Basic keyword is entered onto the screen and into your program. This program by Alan Crabb allows Beeb users to emulate this useful Electron facility.*

*There are 29 keywords in all and the keywords on the keys are exactly the same as for the Electron, so anyone using both the BBC and the Eletron can still use the single keyword entry on the BBC.*

*With the utility installed using the single entry is simple. Ensure that caps lock is engaged (the caps lock light should be illuminated), press CTRL and the key on which relates to the keyword needed. To get the usual CTRL effect simply disengage caps lock and the keys have their normal effect (ie, CTRL – U deletes present line).*

*The routine may be turned off using *CODE 0 0 and re-engaged using *CODE 0 1. To get rid of it permanently type *FX 247 <Return> then press Break. A list of the keys and the keywords they produce is given in figure 1.*

*The routine works by intercepting the Operating System ReaD CHaracter routine (OSRDCH). It decodes the value for the character read and if caps lock is engaged, CTRL pressed and the key legitimate, the routine inserts the keyword and Return if OLD or RUN into the keyword buffer. The routine intercepts Break using *FX 247 and re-initialises itself.*

## How to enter Electron Keys

*The program can be entered in the normal way. Save the source program before attempting to run it. Correct any errors that may occur. Take care to enter the keyword data exactly as shown, and all on a single line. The program incorporates a checksum routine that will check that your machine code is correct. All being well you will see the message 'Electron Keys' displayed.*

*The program assembles from &900 and also requires space in page &A. This area is normally used by the cassette filing system, serial port and sound buffers. If you need to use any of these facilities the machine code will need to be assembled elsewhere. In such cases the checksum will be incorrect.*

**Listing 1. The program enables Beeb users to emulate an Electon facility**

```
   10 REM Electron Keys
   20 REM by Alan Crabb
   30 REM B/B+/M
   40 REM (C) Acorn User May 1986
   50 :
   60 start=&900
   70 readv=&210
   80 uservec=&200
   90 osbyte=&FFF4
  100 oswrch=&FFEE
  110 osrdch=&FFE0
```

Continued ▶

# TOP OF THE LIST

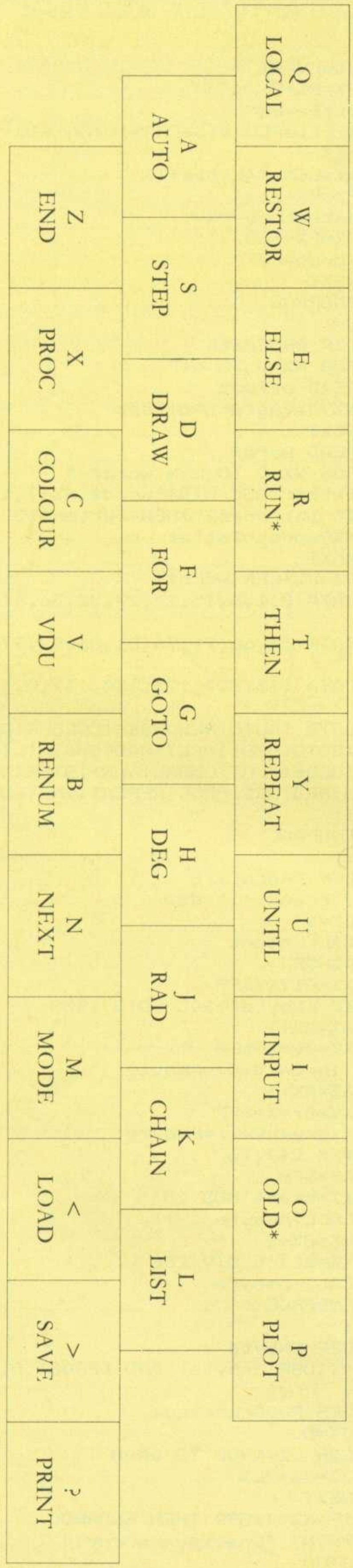



**Figure 1 – Electron Keys! See Top of the List**

◄ Crabb's listing 1 continued

```
120 PROCassemble
130 PROCdata
140 PROCchecksum
150 PROCstart
160 END
170 :
180 DEF PROCassemble
190 FOR pass=0 TO 3 STEP 3
200 P%=start
210 [OPT pass
220 PHP
230 BCC end
240 LDA readv
250 STA rdch+1
260 LDA readv+1
270 STA rdch+2
280 LDA #rdch MOD 256
290 STA readv
300 LDA #rdch DIV 256
310 STA readv+1
320 LDA uservec
330 STA userV
340 LDA uservec+1
350 STA userV+1
360 LDA #user MOD 256
370 STA uservec
380 LDA #user DIV 256
390 STA uservec+1
400 JSR mess
410 .end
420 LDA breakV+1
430 BPL more
440 PLP
450 RTS
460 :
470 .more
480 PLP
490 JMP (breakV)
500 :
510 .mess
520 LDX #li MOD 256
530 .ploop
540 LDA title,X
550 JSR oswrch
560 DEX
570 BPL ploop
580 RTS
590 :
600 .user
610 CMP #0
620 BNE notcode
630 CPX #0
640 BNE notcode
650 CPY #0
660 BNE on
670 LDA rdch+1
680 STA readv
690 LDA rdch+2
700 STA readv+1
710 RTS
720 :
730 .on
740 LDA #rdch MOD 256
750 STA readv
760 LDA #rdch DIV 256
770 STA readv+1
780 JMP mess
790 :
800 .notcode
810 JMP (userV)
```

Continued ►

◀ **Crabb's listing 1 continued**

```
 820 :
 830 .rdch
 840 JSR osrdch
 850 BCS escape
 860 STA &70
 870 TYA
 880 PHA
 890 TXA
 900 PHA
 910 LDA #&CA
 920 LDY #&FF
 930 LDX #0
 940 JSR osbyte
 950 TXA
 960 AND #&50
 970 CMP #&40
 980 BEQ capslock
 990 .return
1000 PLA
1010 TAX
1020 PLA
1030 TAY
1040 LDA &70
1050 CLC
1060 .escape
1070 RTS
1080 :
1090 .fin
1100 LDA #0
1110 STA &70
1120 BEQ return
1130 .capslock
1140 LDA &70
1150 CMP #&1B
1160 BCC letter
1170 SEC
1180 SBC #&10
1190 CMP #&1C
1200 BCC return
1210 CMP #&20
1220 BCS return
1230 .letter
1240 STA &70
1250 CMP #13
1260 BNE word
1270 LDA #&81
1280 LDX #&9A
1290 LDY #&FF
1300 JSR osbyte
1310 CPY #0
1320 BEQ return
1330 .word
1340 LDY &70
1350 LDA datastore,Y
1360 TAY
1370 LDX #0
1380 .loop
1390 LDA words,Y
1400 CMP #124
1410 BEQ fin
1420 STY &71
1430 TAY
1440 LDA #&8A
1450 JSR osbyte
1460 LDY &71
1470 INY
1480 BNE loop
1490 ]
1500 breakV=P%
1510 P%=P%+2
```

**Continued** ▶

◀ **Continued**

```
1520 userV=P%
1530 P%=P%+2
1540 title=P%
1550 $title=CHR$13+CHR$10+CHR$10+"syeK nortcelE"
1560 li=LEN $(title+1)
1570 P%=P%+li+1
1580 datastore=P%
1590 P%=P%+&20
1600 words=P%
1610 NEXT
1620 ENDPROC
1630 :
1640 DEF PROCdata
1650 FOR N%=0 TO &1F
1660 READ offset
1670 N%?datastore=offset
1680 NEXT
1690 READ word$
1700 FOR N%=0 TO LEN word$-1
1710 letter=ASC MID$(word$,N%+1,1)
1720 IF letter=42 THEN letter=13
1730 N%?words=letter
1740 NEXT
1750 P%=P%+LEN(word$)
1760 DATA 0,1,6,15,22,27,32,36,41,45,51,55
1770 DATA 61,66,71,76,81,86,92,97,102,107
1780 DATA 113,117,125,130,137,0,141,0,146,151
1790 DATA |AUTO|RENUMBER|COLOUR|DRAW|ELSE|FOR|GOTO|DEG|INPUT|RAD|CHAIN|LIST|MODE|NEXT|OLD*|PLOT|LOCAL|RUN*|STEP|THEN|UNTIL|VDU|RESTORE|PROC|REPEAT|END|LOAD|SAVE|PRINT|
1800 ENDPROC
1810 :
1820 DEF PROCstart
1830 ?(breakV+1)=&80
1840 C%=1
1850 CALL start
1860 A%=&F7
1870 X%=0:Y%=&FF
1880 IF FNbyte<>&4C GOTO 1950
1890 A%=A%+1
1900 X%=0:Y%=&FF
1910 ?(breakV+0)=FNbyte
1920 A%=A%+1
1930 X%=0:Y%=&FF
1940 ?(breakV+1)=FNbyte
1950 *FX 247,76
1960 A%=&F8
1970 X%=start MOD 256
1980 CALL osbyte
1990 A%=A%+1
2000 X%=start DIV 256
2010 CALL osbyte
2020 ENDPROC
2030 :
2040 DEF FNbyte
2050 =((USR osbyte) AND &FF00) DIV &100
2060 :
2070 DEF PROCchecksum
2080 J%=0
2090 FOR L%=&900 TO &AAB
2100 J%=J%+?L%
2110 NEXT
2120 IF J%=41590 THEN ENDPROC
2130 PRINT "Checksum error!"
2140 STOP
```

# YELLOW PAGES

## ROM COMPATIBILITY QUEST

| | Model B | 6502 SP | ADFS | B+/128 | Master | Electron | Elec+1 | Elec+1 +3 | ROM incompatibility |
|---|---|---|---|---|---|---|---|---|---|
| **Languages** | | | | | | | | | |
| Basic 1 | Y | N | N | N | N | N | N | N | |
| Basic 2 | Y | Y | Y | Y | N | Y | Y | Y | |
| Basic 4 | N | N | Y | N | Y | N | N | N | |
| BCPL | Y | Y | Y | Y | Y | Y | Y | Y | |
| Comal | Y | Y | Y | Y | Y | Y | Y | Y | |
| Acorn Forth | Y | Y | Y | Y | Y | Y | Y | Y | |
| Lisp | Y | Y | Y | Y | Y | Y | Y | Y | |
| Acorn Logo | Y | Y | Y | Y | Y | Y | Y | Y | |
| Logotron Logo | Y | | | | | | | | |
| Open Logo | Y | Y | N | Y | N | N | N | N | |
| ISO Pascal | Y | Y | Y | Y | Y | YC | YC | YC | Wordwise Plus over use of *FX163 |
| Oxford Pascal | Y | | | | | | | | |
| Prolog | Y | Y | Y | Y | Y | Y | Y | Y | |
| **Editors** | | | | | | | | | |
| Altra BASed | Y | | | | | | | | |
| Acorn BASed | Y | | | | | | | | |
| Edword | Y | | | | | | | | |
| InterWord | Y | | | | | | | | |
| Pro-Word | Y | Y | | | | | | | |
| Scribe | Y | N | | | | | | | |
| View 1.4 | Y | Y | Y | P | | | | | Ultracalc |
| View 2.1 | Y | Y | Y | P | | YC | YC | YC | |
| View 3.0 | Y | Y | Y | Y | YS | | | | |
| Wordwise | Y | P | | | | | | | |
| Wordwise Plus | Y | Y | | | | | | | |
| **Spreadsheets** | | | | | | | | | |
| InterSheet | Y | | | | | | | | |
| Ultracalc 2 | Y | Y | Y | Y | Y | Y | Y | Y | |
| ViewSheet | Y | Y | Y | Y | YS | YC | YC | YC | |
| **Databases** | | | | | | | | | |
| DataGem | Y | | Y | Y | | | | | CC Graphics ROM |
| Interbase | Y | | | | | | | | |
| StarBase II | Y | Y | | | | | | | |
| System Delta | Y | | | Y | Y | | | | CC Graphics ROM (turn off with *FX162,255) |
| ViewStore | Y | Y | Y | Y | Y | | | | |
| **Utilities** | | | | | | | | | |
| Accelerator | Y | | | | | | | | |
| Acorn GXR | Y | | | | YS | | | | |
| Addcomm | | | | | | | | | Wordwise Plus. Use ?&3A5=0/?&3A5=128 to turn on/off |
| Addpack | Y | | | Y | | | | | |
| ADE | Y | | | | | | | | Wordwise Plus over use of *FX163 |
| ADT | Y | | | | | | | | |
| AMX Art | Y | | | | | | | | |
| AMX Superart | Y | | | | | | | | |
| Beebmon | Y | | | | | | | | |
| BROM | Y | | | Y | | | | | ROM manager (shouldn't need both!) |
| BROM+ | Y | | | Y | | | | | Disc Doctor (shouldn't need both!) |
| Caretaker | Y | | | | | | | | v1.0 Any Rom which uses TAB key |
| Communicator | Y | | | | | | | | |
| Commstar | Y | | | | N | | | | |
| Crossware Asm | Y | | | | | | | | |

**by Simon Williams**

*The Great* Acorn User *ROM Compatibility Quest has begun (see page 96)! Here is the start of a ROM compatitibility chart that we want you, the reader, to fill in. Let us know of any clashes, no matter how small, that you have encountered. Also, if you know that a certain ROM is incompatible with another then we want to know. Everyone who supplies some information we can use will get a name check in* Acorn User.

*In addition we want to hear about any prefix characters used by a ROM so that we can build up a table. In addition we're interested in any *FX calls used by any ROM, other than those described by Acorn.*

*Simon Williams will be coordinating your details so send them to him care of the AU office and mark your letter 'ROM Compatibility'.*

*This month we're carrying two charts. The first (left) deals with machine compatibility and lists which ROMs will work with which of the Acorn micros, followed by details of any ROM incompatibilities we know of. In some instances a 'fix' is provided! Finally, chart two (page 120) lists letters that commands may be prefixed with to ensure that a particular command reaches the ROM in question.*

*We propose that ROM commands should be prefixed with the company's intials. In future all AU firmware will allow the use of *AU as a prefix. This avoids use of one prefix character by several suppliers.*

*So help us to help you – we look forward to hearing from you!*

*Send entries to: Simon Williams, ROM Compatibility, c/o* Acorn User, *141-143 Drury Lane, London WC2B 5TF.*

# ROM COMPATIBILITY QUEST

| | Model B | 6502 SP | ADFS | B+/128 | Master | Electron | Elec+1 | Elec+1 +3 | ROM incompatibility |
|---|---|---|---|---|---|---|---|---|---|
| Disc Doctor | Y | | | | | | | | |
| Discmaster | Y | | | | | | | | |
| Dumpmaster | Y | Y | | Y | | N | N | N | |
| Dumpout 3 | Y | Y | | | | | | | |
| Enigma | Y | | | | | | | | |
| Exmon II | Y | N | | P | | N | N | N | |
| Floppy-Wise+ | Y | | | | | | | | |
| Fontaid | Y | | | | | | | | |
| Fontwise | Y | | | | | | | | |
| Graphics ROM | Y | | | | | | | | |
| Gremlin | Y | | | | | | | | |
| Help II | Y | Y | | Y | | Y | Y | Y | |
| Icon Master | Y | Y | | Y | | N | N | N | |
| InterChart | Y | | | | | | | | |
| Investigator | Y | | | | | | | | |
| Gemini LBO | Y | | Y | Y | | N | N | N | CC Graphics ROM |
| Macrom | Y | | Y | | | | | | |
| Mega-Rom | Y | | | | | | | | |
| Meta Assm | Y | | | | | | | | |
| BBC Monitor | Y | Y | Y | Y | Y | N | N | N | |
| Murom | Y | N | | N | | N | N | N | |
| NovaCAD | Y | Y | | Y | | | | | |
| Pagemaker | Y | N | N | Y* | | | | | CC Speech ROM, Disc Doctor, Demon ZROMM, SPQR ROM |
| Printmaster | Y | | | | | | | | |
| Probe | Y | | | | | | | | |
| Prog Builder | Y | | | | | | | | |
| Replay | Y | N | | | | | | | |
| Replica III | Y | | | | | | | | |
| Rom Manager | Y | P | | | | | | | |
| Rom Master | Y | | | | | | | | |
| ROM-Spell | Y | N | | | | | | | |
| Romas | Y | Y | | | | | | | |
| Romit | Y | P | | Y | | N | N | N | |
| Scythe | Y | P | | | | | | | |
| Slave | Y | P | | | | | | | |
| Slave+ | Y | | | | | | | | |
| Sleuth | Y | N | | Y | | N | N | N | |
| Acorn Speech | Y | | | | | | | | |
| CC Speech | Y | Y | | | | | | | |
| Spellcheck | Y | | | | | | | | |
| SpellcheckIII | Y | Y | | Y | | N | N | N | |
| SPY2 | Y | P | | | | | | | |
| Starmon | Y | Y | | | | | | | |
| Studio Eight | Y | | | | | | | | |
| Tango | Y | | | Y | | | | | |
| Termi | Y | P | | | | | | | |
| Termi II | Y | Y | | | | | | | |
| Toolkit Elect | N | N | N | N | N | Y | Y | Y | |
| Toolkit+ | Y | | | | | | | | |
| Toolstar | Y | P | | | | | | | |
| Transferom | Y | P | | | | | | | |
| Termulator | Y | Y | | | YS | | | | |
| User Dump | Y | Y | Y | Y | Y | P | P | P | |
| User ROM | Y | NP | Y | Y | Y | YP | Y | Y | |
| VASM | Y | N | | | | | | | |
| ViewSpell | Y | Y | | | | | | | |
| Word-Aid | Y | | | | | | | | |
| Wordease | Y | Y | | Y | | N | N | N | |
| 3D Zicon | Y | | | | | | | | |

**Key** (blank) – Unknown, information would be welcome. Y – Yes, compatible, though may not use some features, such as shadow RAM. P – Partly compatible, most routines work. N – No, major incompatibility. S – Supplied with machine. C – Cartridge available. * – Shadow Mode off. CC – Computer concepts.

**A** – ADT, Altra
**B** – Beebugsoft
**C** –
**D** –
**E** –
**F** –
**G** –
**H** –
**I** –
**J** –
**K** –
**L** –
**M** –
**N** –
**O** –
**P** –
**Q** –
**R** –
**S** – Software Services
**T** –
**U** – Acorn User
**V** –
**W** –
**X** – AMX
**Y** –
**Z** – A&F, Clares
**SD** – Minerva

**A: Chart 2. Letters to prefix commands with to ensure they reach the right ROM**

## Note

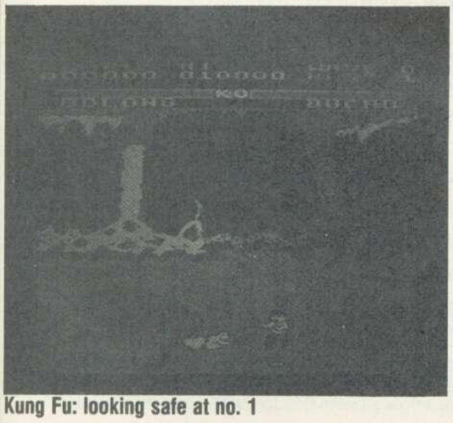
*Quoted clashes are not 'blamed' on either party! Some clashes can be overcome by changing the priorities of ROMs.*

# CHARTS

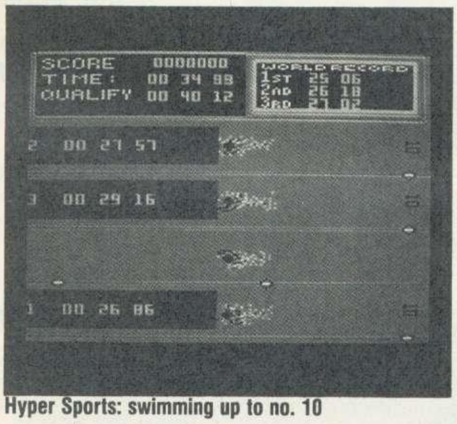
**Check out the latest position of your favourite game**

# TOP 20 BBC MICRO GAMES

| | Title | Publisher | Cassette | Disc | B+ | Master | Reviewed |
|---|---|---|---|---|---|---|---|
| 1 (1) | Yie Ar Kung Fu | Imagine | £9.95 | £12.95 | No | No | March '86 |
| 2 (2) | Way of the Exploding Fist | Melbourne House | £9.95 | – | Yes* | Yes* | April '86 |
| 3 (9) | Citadel | Superior | £9.95 | £11.95 | Yes | * | March '86 |
| 4 (3) | Strike Force Harrier | Mirrorsoft | £9.99 | £12.99 | Yes | No | January '85 |
| 5 (4) | Repton 2 | Superior | £9.95 | £11.95 | Yes | * | December '85 |
| 6 (7) | Computer Hits (10) | Beau Jolly | £9.95 | – | Yes | No | – |
| 7 (15) | Speech! | Superior | £9.95 | £11.95 | Yes | * | February '86 |
| 8 (5) | Night Shade | Ultimate | £9.95 | – | * | * | May '86 |
| 9 (8) | Match Day | Ocean | £9.95 | – | Yes | Yes | January '86 |
| 10 (–) | Hyper Sports | Imagine | – | £12.95 | No | No | May '86 |
| 11 (10) | Gyroscope | Melbourne House | £8.95 | £14.95 | Yes | Yes | May '85 |
| 12 (6) | Dr Who and the Mines of Terror | Micro Power | £18.95 | £19.95 | No | No | March '86 |
| 13 (–) | Steve Davis Snooker | CDS | £8.95 | £12.95 | No | * | May '86 |
| 14 (19) | Phantom Combat | Doctor Soft | £9.95 | £11.95 | Yes | Yes | February '86 |
| 15 (16) | Combat Lynx | Durrell | £8.95 | – | Yes | * | September '85 |
| 16 (–) | Spectipede | Mastertronic | £1.99 | – | * | No | – |
| 17 (11) | Revs | Acornsoft | £14.95 | £17.65 | Yes | Yes | July '85 |
| 18 (12) | Bullseye | Macsen | £8.95 | – | * | * | – |
| 19 (13) | Waterloo | Lothlorien | £9.95 | £12.95 | Yes | Yes | April '86 |
| 20 (14) | Elite | Acornsoft | £14.95 | £17.65 | Yes | No | October '84 |



Kung Fu: looking safe at no. 1




Hyper Sports: swimming up to no. 10




Night Shade: reviewed on page 125

# TOP 10 ELECTRON GAMES

| | Title | Publisher | Cassette | Disc | Reviewed |
|---|---|---|---|---|---|
| 1 (2) | Yie Ar Kung Fu | Imagine | £8.95 | – | March '86 |
| 2 (1) | Computer Hits (10) | Beau Jolly | £8.95 | – | – |
| 3 (3) | Beach Head | Access/US Gold | £8.95 | – | December '85 |
| 4 (–) | Citadel | Superior | £9.95 | – | March '86 |
| 5 (–) | Spectipede | Mastertronic | £1.99 | – | – |
| 6 (4) | Repton 2 | Superior | £9.95 | £11.95 | December '85 |
| 7 (8) | Blockbusters | Macsen | £7.95 | – | – |
| 8 (10) | The Mine | Micro Power | – | £9.95 | – |
| 9 (–) | Stockcar | Micro Power | £6.95 | – | – |
| 10 (–) | Felix and the Fruit Monsters | Micro Power | £2.50 | – | – |

COMPILED BY GALLUP/MICROSCOPE

*PLEASE CHECK B+ MASTER COMPATIBILITY WITH SUPPLIER BEFORE BUYING

# LLAMASOFT

JEFF MINTER's

## COLOURSPACE

*A LIGHT SYNTHESISER*

"So brilliant that I find words too cumbersome to describe it.. **the perfect accompaniment to any kind of music-**"

"You get to create **amazing flowing geometrical bursts of colour** on your computer-"

"..a delight to use and to watch.. a superb visual accompaniment to music.. **puts many a disco to shame.**"

"..intended to blow your mind- in the nicest possible way.. **an interactive firework display.**"

"..anyone who can manipulate a joystick or press a key can will enjoy **COLOURSPACE..**"

*NOW AVAILABLE FOR the BBC B - £7.95 on tape from your computer store or direct from*

Llamasoft Entertainment Software

*49 MOUNT PLEASANT TADLEY HANTS (tel 07356 4478)*

---

# FRAMEWORK

# PRINTAPAKS

## COMPUTER PRINTER PAPER

Premier quality continuous stationery with sprocket margins and page breaks specially micro-perforated to give perfect finish.

**SIZE**

The European Standard — A4/Nominal. 9.25" width x 12.00" length. This separates to a finished size of A4 width (8.30") when the sprocket margins are removed.

**GRADES AVAILABLE**

**(A). 100gsm LAID.** A luxury quality watermarked paper ideal for WORD PROCESSING, REPORTS, PRESENTATIONS, C.V's, THESES etc.

**(B). 80gsm BOND.** A top quality paper suitable for all general applications including WORD PROCESSING, ACCOUNTS, GRAPHICS, SPREADSHEETS etc.

**(C). 60gsm BOND.** A good quality low cost paper ideal for PROGRAMME LISTINGS, VOLUME DATA, DRAFTS etc.

**PRICES**

| SHEETS | 100gsm. | 80gsm. | 60gsm. |
|---|---|---|---|
| 250 | £7.95 | £3.95 | £2.95 |
| 500 | £13.95 | £6.95 | £5.95 |
| 1000 | £24.95 | £11.95 | £9.95 |

**Postage & Packing**
Orders: Up to £10/pp £2:
Up to £20/pp £3:
Over £20/pp £5:

*Other sizes & quantities available including A5. Send 50p for samples & prices.*

*Please enquire for details of...*

*COMPUTER LABELS · FLOPPY DISCS*
*DISC STORAGE CASES*
*PRINTER STANDS*

**FRAMEWORK MARKETING LTD.**
PO BOX 120, WHITLEY BRIDGE.
GOOLE, DN14 0HA.
TEL: 0977-662800

---

**QUAL-SOFT** THOUGHTWARE **Sports simulations**

***"A real challenge to the thinking football fan . . . Bobby Robson could do worse than have a crack at this in his preparation for the World Cup".*** **AMSTRAD ACTION REVIEW Jan '86**

**QUAL-SOFT COMMENT:** At last an INTELLIGENT management game for the knowledgeable soccer enthusiast!

In 1966 Alf Ramsey proved that English club soccer players, with intelligent management, could not only dominate European club football, but could take on, and beat the rest of the world at International level. Could you do the same in . . . .

# MEXICO '86*

## A WORLD CUP MANAGEMENT SIMULATION

**Tape 1** (Qualifiers)
+ **Tape 2** (Finals)
+ 20 Page Booklet
**£9.95**

**DISC**
Qualifiers + Finals
+ 20 Page Booklet
**£12.95**

Summer 1984 and English International football is at its lowest ebb. We have failed to qualify for the European Nations Cup, and had a string of very poor International results. In a few months we will set out on the '86 World Cup qualifying trail. You have been given the most important job of restoring English pride in their football. You have a match in Paris, the USSR at Wembley, and a South American tour, to assemble a team, first to qualify, and then to beat the world's best in Mexico.

**TAPE 1 (Qualifiers)**

- ★ Current squad of 16 players + 20 user defined players.
- ★ Friendlies in Paris, at Wembley + South American tour.
- ★ ANY team formation you choose. 2 from 5 substitutes.
- ★ In match tactics: any no. of individual player adjustments.
- ★ Your qualification group: full results and table.

**TAPE 2 (Finals)**

- ★ Choose a 20 man squad to take to the finals.
- ★ Group of 4 prelims. 16 to final knockout comp.
- ★ Extra Time, PENALTY SHOOT-OUTS, where relevant.
- ★ Formation and strength information on opposition.
- ★ 2 from 9 substitutes (the FA tells us so).

**ENGLAND'S GAMES: FULL PITCH, 22 MAN, 3D GRAPHICS & SOUND EFFECTS**

QUAL-SOFT comments: With 5 levels of play, 12 depths of sophistication, and "fun" graphics, this game can be enjoyed by an 8 year old youngster as a "fun" game, and by the most sophisticated as a tactical/strategy challenge of the highest order.

**QUALSOFT GUARANTEE: We will send your package by 1st class letter post on the day we receive your order with PO, cheque or ACCESS card authorisation. Programs are IN STOCK because we manufacture them!**

* The use of the name MEXICO '86 does not imply any association with FIFA

**QUAL-SOFT,** **Tel: 0438 721936**
**Dept. AU**
**18 Hazelmere Rd.,**
**Stevenage, Herts SG2 8RX.**

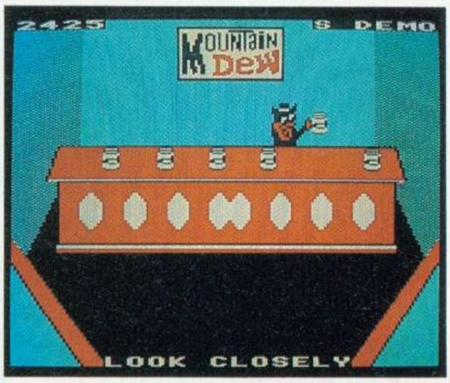
Please supply:
MEXICO '86
Electron ☐
BBC 'B' ☐ T ☐ 40 ☐ 80

Name: ..........................................
Address: ..........................................
..........................................
Access No. (if applicable) ..........................

# REVIEWS

## GAMES

### BARRELS OF FUN ON TAP




**'Tapper', US Gold, BBC B, £9.95 (cassette or disc)**

This arcade game is a barrel of laughs. Several barrels, in fact, because you play a frantic bartender whose job is to keep an ever-growing crowd of customers satisfied. They sidle into various parts of the bar and you have to leap around, filling glasses from the beer taps, slinging them along the bar, saloon-style, and collecting the empties they sling back at you. You lose a life if you keep a thirsty customer waiting too long.

(Actually, the instructions have been carefully edited for the benefit of under-age users, and would like us to believe that it's really a soda fountain and you're only serving fizzy pop. But that doesn't fool anyone.)

As you become proficient, you'll be promoted from the Wild West Saloon to the Jock Bar (patronised not by thirsty Scotsmen, thank goodness, but by sporty people in baseball caps), then to the Punk Bar, with its purple-haired customers, and finally to the Space Bar, full of creatures almost as weird as the punks. In between bars, you can pick up bonus points in an interlude with the 'Soda Bandit'. He shakes up cans of Budweiser – sorry, soda pop – then shuffles them around rapidly. You score by picking the one he hasn't shaken and opening it. If you guess wrong, you're sprayed. Either way, you're soon back in the bar with a hoard of impatient customers.

Sometimes, one of the customers is kind enough to leave you a tip.

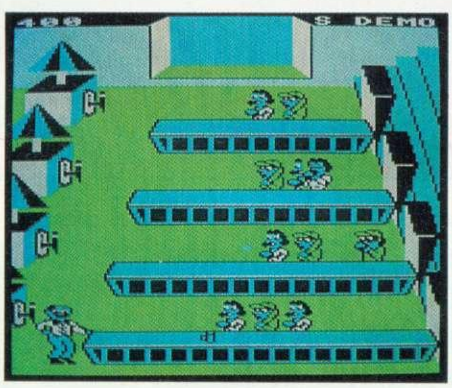
If you can collect it without mishap, a pair of dancing girls start doing a can-can and most of the punters stop drinking to watch – which gives you a breather. It's all good fun and very reminiscent of The Sun, the *Acorn User* local.

The instruction leaflet was obviously printed for an earlier version of the game, for another micro.

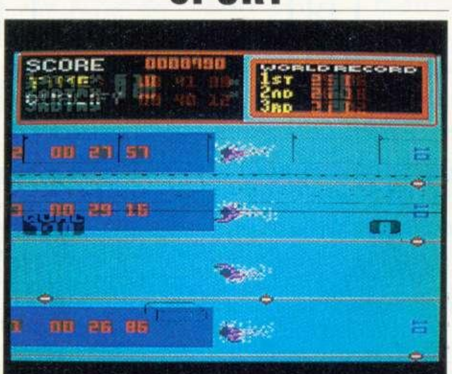
It suggests, for example, you can use a joystick on the BBC micro version, which you can't (although you can choose your own keys), and it talks about the two-player game, which also isn't available.

Never mind, it's easy enough to learn to play – but frustratingly difficult to play it well. It's an entertaining game with a high very addictiveness rating.

**Jeffery Pike**




### MIXED SPORT




**'Hyper Sports', Imagine, BBC B, £14.95 (disc only)**

Four things are tested by Olympic games – the speed, and the endurance, of your hands at hammering the keyboard; reaction time to changing events on the screen (like rapidly increasing angles, etc); and accuracy (either by hitting a target, or by doing something at a precise point such as a take-off line). The very best events are those which can challenge all four abilities and get you to co-ordinate them –




javelin-throwing is a good example. But for the newer games, new events are being introduced – and only a few successfully involve all the challenges of the best Olympic games.

The quality of the six individual events in *Hyper Sports* vary enormously.

By listening to the sound effects, the opening events – skeet shooting and swimming – can literally be played with your eyes closed. On the other hand, the archery offers an intriguing challenge (the wind speed and direction vary, so the event can be different each time you play). The triple jump provides a true test of co-ordinating speed, angle and timing. And the weightlifting is a good challenge to your finger muscles – if you can get that far in the game!

The problem is that the central event, gymnastics, operates on totally incomprehensible principles.

There just doesn't seem to be a 'method' you can master, so your results are completely unpredictable. It's enormously frustrating to fail at the gymnastics each time, and be sent back to the easy opening events, never reaching the later, better games.

And there is no 'practice' way of trying out the various events; you have to play in sequence every time.

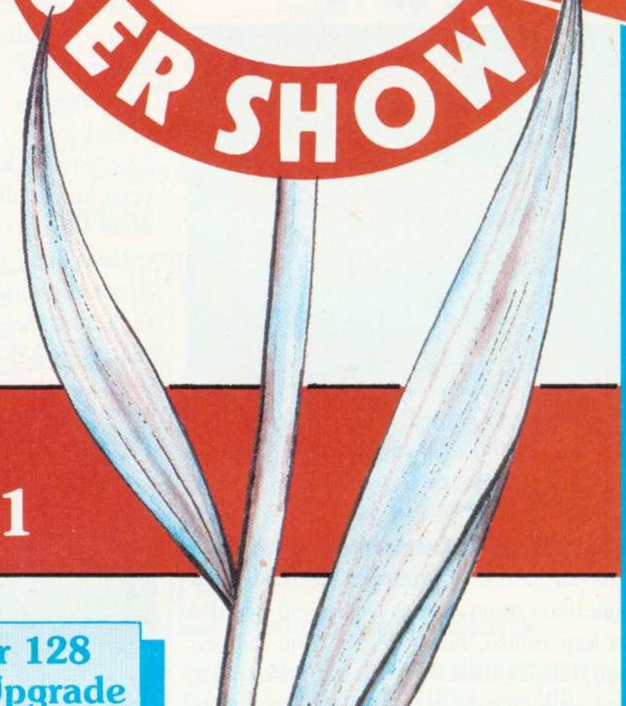
In the end, I felt those frustrations and the easy, boring opening games outweighed the really entertaining events. There are three good events, two boring and one that's just plain duff – for me, that doesn't count as enough to be value for money.

**Paul Keers**

# ELECTRON & BBC MICRO USER SHOW

## *The show that gives you the FIRST look at all the latest hardware and software now being produced for the BBC Micro and Electron*

**Friday to Sunday, May 16 to 18**



## Royal Horticultural Hall Westminster, London SW1

**Problems? Then this is the show where you'll find the answers! Leading experts in all aspects of the BBC Micro and Electron will be there to lend a helping hand – whether you're a beginner or an advanced user.**

**See the BBC Master 128 and Master Turbo Upgrade – first of the exciting new generation of BBC Micros**

Lots of bargain bundles

. . . as suppliers clear the decks for all the new season's products

*Show opens 10am each day. Closes 6pm Friday & Saturday; 4pm Sunday*

***Organised by Database Exhibitions***

***Save £1 a head – and miss the queues! – by sending for your tickets now!***

**Advance ticket order**

*Please supply:*

☐ Adult tickets at £2 (save £1) ............ £ ______

☐ Under-16s tickets at £1 (save £1) ...... £ ______

Total £ ______

☐ Cheque enclosed made payable to Database Publications Ltd.

☐ Please debit my credit card account:

Access ____ ____ ____ ____

Visa ____ ____ ____ ____

***Admission at door: £3 (adults), £2 (under 16s)***

**Post to:** ***Electron & BBC Micro User Show Tickets, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.***

Name ................................................

Address ................................................

................................................

................................ Signed ................

**PHONE ORDERS: RING SHOW HOTLINE: 061-429 7931**

*Please quote credit card number and full address + Ref.* AU5

# REVIEWS

## GAMES

## SATISFYING SNOOKER




**'Steve Davis Snooker', CDS Software, BBC B and B+, £8.95 (cassette), £12.95 (disc)**

Here's your chance to play snooker against the Romford maestro, and even beat him. Steve 'Interesting' Davis apparently endorsed this program, and it must be said that it's a pretty accurate computer representation of the game.

The table is illustrated on screen in mode 2, with green cushions and a black playing surface – which causes a few problems straight away, like how do you show the black ball? (Answer: a white circle, black inside. Similarly the brown is really green and red.) Also, mode 2 graphics only allow fairly rough-and-ready shapes: the balls are chunky crosses.

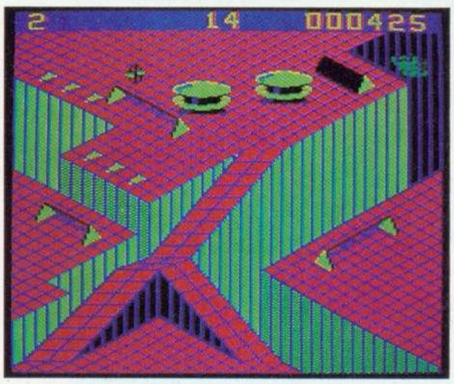
Before you start, you select the speed of the table (fast, normal or slow), decide whether to play against an opponent or the computer or yourself (good for practising), then, if you're playing the computer, elect just how good your opponent (S Davis Esq) is going to be, from 9 (unbeatable) to 1 (frankly pretty ropey). When it's your turn to pot, you use the keyboard to position a hairline cross exactly where you want to hit the target ball, to define the spin and pace of the cue ball, and to fire.

The results are generally much the same as when I play on a real table – balls rocketing everywhere, the occasional fluky pot, a foul stroke every now and again, and a very rare brilliant snooker. The computer keeps score and does everything else that nice man with the white gloves does, respotting the balls, calling the fouls, asking if you'd like your opponent to play again after a foul stroke, and so on.

The balls don't move round the table exactly like the real thing but, all things considered, the animation is fairly smooth. A bit of sound might help: surely it wouldn't slow things down too much to have a click when balls collide? It's quite enjoyable to play, fairly frustrating (just like the real thing) and, believe me, immensely satisfying when you land Smug Davis in an unplayable snooker.

**Jeffery Pike**

## LOADS OF CHALLENGES




**'Gyroscope', Melbourne House, BBC B and Electron, £8.95 (cassette)**

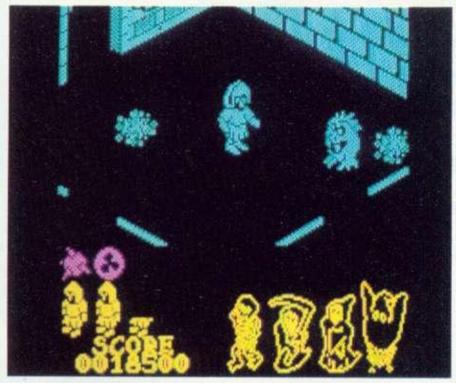
Every so often, you come across a piece of games software which you suspect was much more fun to write than it is to play and here's a case in point. You have to steer a spinning gyroscope across platforms and down ramps, into holes like those on bar billiards tables (hands up those who remember bar billiards). When you've achieved this, you get another screen, with more platforms and more ramps, leading to another hole. And then another one.

The programming is ever-so-clever. The screens look solidly three-dimensional and your gyroscope behaves just as a real one might if you had remote control over it – reacting slowly but surely to a twitch on the rudder (keys or joystick), rolling faster down the steep slopes than the gradual ones, trundling slowly uphill when necessary, and falling off the edge if you oversteer. John Nixon and David Wainwright are to be congratulated for some neat graphics, and a brilliant application of three-dimensional geometry and the law of gravity. But as for playing the game . . .

I just couldn't get excited about it. I couldn't see *why* I should want to steer a gyroscope into a hole, and thus I didn't care much one way or the other if I made it or not. I'm not sure what it is that's missing, but all the best computer games have some in-built compulsive element which makes you want to go on playing and doing better. This one, clever though it is, simply doesn't.

**Jeffery Pike**

## THE SEQUEL'S SEQUEL




**'Nightshade', Ultimate, BBC B £9.95 (cassette)**

I enjoyed *Nightlore,* I really did. The advances Ultimate made with its 'filmation' technique were, at the time, amazing. *Alien 8* was more of the same. It was claimed it had a better plot, but it was generally felt to have less going for it. This latest offering changes the backdrops again, offers a few more nicely drawn nasties, but for all that is very much the same as its previous two adventure cartoons.

The cassette sleeve tells of a nightmarish village populated by ghouls and ghosties. All that can save the Kingdom is a weird little fellow in a habit. Guess who controls him?

The game uses the same 3D effects as before, with the interesting development that walls containing doorways vanish as you walk your hero through. It gives the game a more solid feel, and the buildings are very well drawn tudor-panelled affairs.

There's a motley assortment of meanies, some of them brainless and looking like escapees from a Maurice Sendak book, others with a nasty line in zapping you. You have a variety of different weapons (bacteria the blurb calls them), and most of these work on most of the baddies most of the time.

The colour schemes are pretty dull, using no stippling or other screen-enlivening effects, and sounds are few and far between.

The *Nightshade* cassette comes with a second bonus tape, containing a game rejoicing in the name of 'Head Cleaner'. This one has very poor graphics, no sound (except a peculiar rasping from the tape machine while it's loading), and precious little plot. Seriously, though, it's quite a fun package, but it's about time Ultimate came up with something new.

**Simon Williams**

# GIVE YOUR BBC THE PC LOOK

**WITH THE Viglen PROFESSIONAL CONSOLE UNIT (P.C.U.)**

ONLY **£49** (INCLUDING VAT)

PRICE INCLUDES COILED CABLE



**Give your BBC Micro System** the professional PC-look by replacing your existing lid with this smartly styled package. House your computer, monitor, disk drives & ROM cartridge system neatly in this strongly constructed, high impact ABS unit, colour matched to the BBC micro, and give yourself an outfit to impress all who see it.

This unit will support monitors including 14" television sets.

Capable of accepting most internal expansion boards such as Solidisk, ATPL Sidewise, Midwich 16, RAMAMP 16+32k Exprom, Computer Village CVX16, HCR Sideways, 6502 2nd processor boards. Fully ventilated. Full fitting instructions.

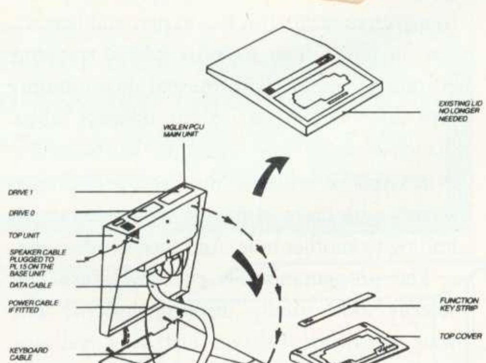
DEALER ENQUIRIES WELCOME.

**Package includes:**

- Keyboard case
- Screened main unit casing including internal fittings
- 2.0 metre coiled cable to connect main unit to keyboard
- Blanking plates included to blank out disk drive aperture
- Keyboard label

**ACCESSORIES (prices inc. VAT)**

1. 2.0 metre coiled cable on its own ............ £15
2. Dual-drive data cable .......... £9
3. Dual-drive power cables ........ £5
4. Special internal switch mode power supply kit capable of running two half-height drives cool running ............ £35
5. Fan kit, only necessary in extreme cases ........... £35
6. Fitting available from ........ £15
7. Extension keyboard on its own ............ £29
8. Also available with single or dual drives ready fitted ............. *Price on Application*



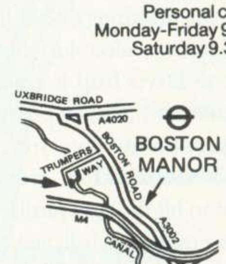

## How to order:

By post –
Simply fill in the coupon. Enclose your Cheque, P.O. or use your Access, Barclaycard. Please make cheques payable to VIGLEN COMPUTER SUPPLIES and post to the address stated.

Allow seven days for delivery. Add £6.00 carriage, packing and insurance.

Or telephone:
01-843 9903
Credit card holders (Access, Barclaycard only) can purchase by telephone. Please give Card No. name, address and items required.
Viglen are also major supplies to educational and government establishments and welcome futher enquiries and orders.

Unit 7, Trumpers Way,
Hanwell W7 2QA
Tel: 01-843 9903
Personal callers:
Monday-Friday 9.30-5.30pm
Saturday 9.30-4pm




Free parking available

**Post to: VIGLEN LTD., UNIT 7, TRUMPERS WAY, HANWELL, LONDON W7 2QA.** **Telephone: 01-843 9903** AU4/6

Please send me______(Qty) VIGLEN PC Unit(s) Plus Accessories ____________________ State ref numbers

I enclose Cheque/P.O. for ____________________ Please add £6 for postage, packing and insurance.

I prefer to pay by ACCESS/BARCLAYCARD* Delete whichever is not applicable

Card No.____________________ Signature ____________________

Name ____________________

Address ____________________

____________________ Postcode____________________

Tel. No. ____________________

Credit Cards valid if signed by Cardholder.
Address below must be the same as card holders.

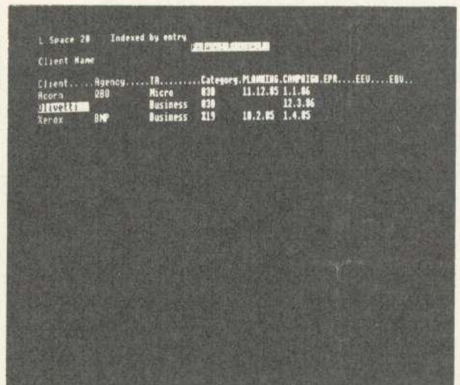
SOFTWARE

# WITH A VIEW TO STORAGE

**Alex van Someren delves into Acornsoft's database ROM and decides it's good value for money**

*ViewStore* is the latest ROM offering from Acornsoft in its *View* family of loosely-connected business software for the BBC micro and Master series. Supplied as a 16k ROM, manual and utilities disc it supports DFS, ADFS and Econet filing systems, although its performance with the latter is decidedly uninspiring except when used with the presently-unreleased ANFS – I'll tell you more about that later.

*ViewStore* is a fairly sophisticated package, allowing the computer-literate user to set up a good environment for working with databases, and it's certainly one of the best for Acorn equipment currently on the market.



***ViewStore*'s spreadsheet display mode**

## Configuring ViewStore

Like all general-purpose database systems *ViewStore* needs a significant amount of setting-up before data can be entered and the database put to work. After installing the ROM the user must configure *ViewStore* so it can find all the various files needed to run the database – it expects to find a database file, a format file (controlling the screen and data formats) and usually a number of index files. Each kind of file must be stored in a different directory, each named with an initial letter, eg, 'D' for the database files. The Prefix command establishes where the directories D, F and I (and others) are found on the current filing system, so for example, one might set the Prefix for the database files to be ":0." whereupon *ViewStore* will always search for a database file by trying to open ":0.D.databasename". This arrangement is a little unnecessary when using hierarchical filing systems such as the ADFS or Econet, but can save a lot of bother when using ordinary floppy discs. In this way *ViewStore* manages to accommodate all Acorn filing systems and any number of disc drives with minimal preamble, though a boot file is definitely required!

Once you have set up the system using Prefix, *ViewStore* expects you to estimate and enter the amount of space needed by the database overall – the number of records you expect to have, the number of indexes, their filenames, and the index key sizes – using the Setup utility supplied. This process shows how *ViewStore* suffers from Acorn's past mistakes: if, while answering Setup's questions about the expected size of the database, you fail to provide sufficiently over-estimated answers, the DFS will come up against 'Can't extend' errors. On the other hand the manual says that the system operates (ie, after setting up) more slowly with larger files, probably due to the indexing technique used. Since the only cure for such errors is to compact the disc, it appears DFS users will have to suffer slower systems until they upgrade to ADFS, where such problems do not occur.

Finally, before you start entering data, *ViewStore* wants you to tell it the names, types, sizes, constraints and prompts associated with each field of a record, along with a variety of optional information which depends on the specific kind of field. Data types available are alphanumeric, textual, numeric (eg, floating-point) and two date formats (English and American). Alpha and text types have a 'Scroll flag' which allows them to be larger than the available screen space. The distinction between these two types is abysmally glossed over in the manual, and proves to be quite important.

Numeric data has a decimal places control, and all types can have lower and upper limit constraints, eg, earliest date or highest letter of the alphabet. Each field can have a prompt, displayed at the top of the screen when the cursor is on that field, and you may also supply a value list which restricts the data allowed to be entered into the field to entries in the list. There are also several options for indexing.

If this preparation process sounds daunting, then rest assured – it is! But, like most software, it soon becomes second nature and after creating five or six different databases I find the whole process takes about 15 minutes.

Once the formalities have been completed, *ViewStore* is ready for you to enter data onto the screen. *ViewStore* uses two screens in much the same way as *View* does, Escape toggling between them. The data screen can be in one of two formats, either 'spreadsheet' or 'card'. The former shows one record to a line, with fields arranged as columns, and scrolls sideways (almost) infinitely to accommodate fields that are not immediately visible. The latter permits you to layout fields in a pseudo-cardbox style, possibly more useful where you want to keep many fields visible at once. This layout must be designed with an unpleasantly simplistic editor which spoils the card display for me to the extent that I don't bother to use it.

*ViewStore* thinks very hard when you enter data, a fact exaggerated by the time lag between typing things into fields and them actually appearing on the screen. While the delay is not long in real terms, it is more than perceptible and therefore rather irritating. That aside, though, I'm delighted to say that entering data is simplicity itself. The use of a boot file saves time and tears at switch-on, but beyond that stage a child could do it!

## Database usefulness

The ultimate usefulness of any database comes from its indexing capabilities, something which *ViewStore* is not short of. An index can be created for any field in a record, or for several at a time, depending on how they are created. You may use the Index utility to create a one-off index for a field whenever you wish, but when more data is added the index instantly becomes out of date. To overcome this *ViewStore* can maintain indexes on several fields at a time automatically, the exact number being determined by the filing system in use.

# NEW BBC PRODUCTS FROM CLARES

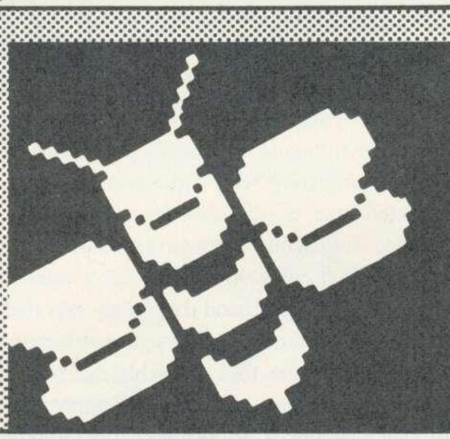
## FONTWISE PLUS £20.00

Due to the phenomenal success of FONTWISE we just had to make FONTWISE PLUS compatible with VIEW as well as WORDWISE and WORDWISE+, at your insistence!

Now you can have PROPORTIONAL and JUSTIFIED text in 12 different fonts, all within the same document if required. In addition to the standard facilities like line and page length, pagination, left margin etc. we have now added

- Enlarged, standard & condensed fonts
- Tabs
- Temporary indent
- User definable line feed
- User definable character spacing
- Non proportional fonts
- Now with 12 fonts
- Plus many more features

If you are not convinced ask us to send you a sample printout and you will be amazed at the quality - requires an EPSON compatible printer capable of single, double and quad density graphics but you do not require any RAM in your printer to use FONTWISE PLUS.



## BETA-ACCOUNTS £25
### STATEMENT AND ACCOUNTS RECEIVABLE MODULE

This module uses the transaction files created by the INVOICE module to prepare statements at regular intervals. The statement run is totally automated once security backups have been completed and will save hours of work every month. The Accounts Receivable allows you to enter all outstanding debts for an account and it is then automatically kept up to date by the invoice program. All payments received are entered into the accounts receivable file and allocated against the outstanding account.

In addition to the time saving operations performed by this module you can also obtain valuable management information such as debtor lists, which can be printed together with telephone numbers. It is also possible to query any particular account and obtain an up to date picture of the position.

## STOCK CONTROL MODULE £25

The stock control module is used in conjunction with the invoice program and is updated whenever an invoice is issued. It is then possible to automatically search the stock file for out of stock or re-order level items. Purchase orders can then be printed, automatically if required.

As with the Accounts Receivable there are many forms of management information available including stock numbers and values both numerically and as a percentage figure. This enables you to identify slow or fast moving parts easily.

A parts explosion option is also available for just £10 extra.

A twin double sided drive is required for the STOCK CONTROL module.

**Ask for a full data sheet**

## MACROM £40
## £35 DISC

MACROM is a fast full featured MACRO ASSEMBLER ROM that allows the use of macros, which are loaded from a macro library stored on disc. Assembly can be from disc to memory, disc to disc, memory to memory or memory to disc, thus allowing the use of very long source code up to the length of your disc. MACROM source code is tokenized and thus takes up far less room in memory or on disc than most assemblers.

- Operate in any mode
- Tokenized source code
- Assembles 6502 & 65C02 codes
- Automatically loads macros from library on disc
- Automatically loads subroutines from disc
- Macro library supplied plus demo files
- Chain program sections into main code
- Many different assembly options
- Converts BBC assembler code into MACROM source code
- Very fast & very flexible

In a comparison with ADE, MACROM was able to assemble a program to disc in 1 min 24 secs compared to 5 minutes with ADE and the source code took up 30% less room on the disc.

**Ask for a data sheet today**

## BROM PLUS £34.50 — £30 DISC

BROM was yet another of our runaway successes and such has been the demand for extra features that we have now produced BROM PLUS. Most of the original BROM favourites are there plus a whole host of additional commands to aid you, the user.

Commands include:

- EDIT - a FULL SCREEN EDITOR, not to be confused with the line editor used in other toolkit ROMs
- ERROR ON traps errors and enters the EDITOR
- FIND all occurence of a string or keyword and enter the editor, TAB will find the next one and so on
- SCHANGE a search and replace facility
- LCOPY & LMOVE allow you to copy and move lines
- PACK is a very powerful routine which removes REMs & spaces and forms multi statement lines in a very intelligent way
- RENUM is a partial renumber facility
- XREF allows you to cross reference your program
- COMPARE a file against memory
- DEDIT a robust disc sector editor
- DFIND to search a disc for a string
- DGET/DPUT to load or save sectors
- FORM allows you to format up to 4 disc sides
- MENU to load programs from a disc with a BROM menu
- XCOPY to selectively copy files from disc to disc
- XDEL to selectively delete files from a disc
- MEDIT to view and edit memory - FAST
- ROMLIST lists all ROMs and their current status
- ROMON & ROMOFF which enable you to turn on/off sideways ROMs even after CTRL/BREAK.

"This is the best BASIC screen editor I have so far used."

MICRO USER August '85

| | |
|---|---|
| 40 80 3" 0 | DISC |
| 40 | 40 TRACK |
| 80 | 80 TRACK |
| 3 | 3" DISC - ADD £3 |
| (chip) | EPROM |

Send for detailed newsletter.
All prices inclusive of VAT & Carriage -
NO EXTRAS! Please state 40 or 80 track disc and state D.F.S. you use.

Clares
MICRO SUPPLIES

**98 Middlewich Rd.,**
**Northwich, Cheshire CW9 7DA.**
**Tel: 0606 48511**
**Open 9—5pm Monday—Friday**
**LUNCH 12.30—1.30**

The DFS and NFS can maintain four indexes, while ADFS can support nine.

The speed (or rather sluggishness) of the system is directly in proportion to the number of indexes being updated, and with more than two the delays mentioned above become even more disturbing.

Records may be ordered on screen by means of any index (including out-of-date ones), allowing instant checks for duplications and gaps. The value of this facility should not be underestimated, as a corrupt database is a useless database!

## Select utility

Once up-to-date indexes exist, *ViewStore* allows more sophisticated record selections using the Select utility. This allows you to generate either a printed list of a subset of the database, or to generate a new database containing that subset, thereby allowing further processing. All the utilities except Select and Setup can use such a file as their source data.

After a few preliminaries Select asks for the selection criteria, of which there can be any number. Each criterion must evaluate to a Boolean value (eg, NAME="Alex", whose value here is TRUE), and the criteria may then be strung together using the Boolean operators AND and OR. To permit complex selections *ViewStore* allows the criteria to be entered over several lines, and multiple bracketing is permitted so the order of evaluation can be forced. Single and multiple character wildcards are allowed, and an option also exists to truncate the amount of a field used in a comparison.

When generating a file of selected data *ViewStore* also asks for the fields by which you wish the resulting records to be sorted. Again, there can be any number of sort fields, so long as 'the total number of characters used in the comparisons is not greater than 250,' whatever that means. The sorts can be performed in either ascending or descending order.

I found the Select utility very easy to use, though it is fairly poorly documented. The distinction between the alphanumeric and textual types is that in the former case the whole field is used in the comparison, whereas in the latter case each word in the field is compared individually. In this context *ViewStore* defines a word to be any number of characters bounded by spaces. I only discovered the three lines discussing this in the manual as I was writing the review, and this highlights the lack of a summary of the selection commands, a serious omission in discussing an area which much of the system revolves around.

The 'select file' produced by the Select utility can be used by some other utilities to produce formatted output and link *ViewStore* with other members of the *View* family.

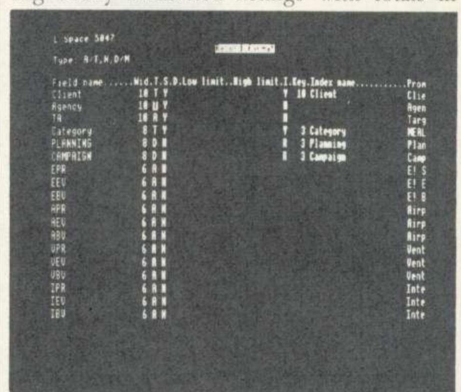
The Macro utility translates a select file into a series of *View* macro lines, one per record, which may then be read into *View* to provide data for labels, form letters, etc. Macro simply asks the user to enter the order in which the fields are wanted in the macro to be generated, and requests a name for the resulting file.

The Link utility performs a similar function for transferring data to *ViewSheet*. Again, you may specify which fields you wish to transfer and in which order, followed by a filename which is usually of the form "V.VSn" (n=0-255) to be compatible with *ViewSheet*'s Read facility. The Link utility is not as comprehensive as Macro in that it can only transfer numeric fields, a little surprising knowing that *ViewSheet* accommodates labelling of rows and columns and that the field names are readily available from *ViewStore*.

No prizes for divining the purpose of the Labels utility, which is a short-cut to avoid using Macro and then having to go into *View*. The numerous options ensure that nearly every size and shape of continuous label stationery can be used, and a nice touch is the 'Alignment print' option, which allows you to make a mess of reams of labels in order to get them aligned before printing a full set. Anyone who has printed labels more than once or twice will understand what a good idea this is!

The fiendishly useful Import program is actually a chunk of Basic and machine code which converts foreign data formats into *ViewStore* databases. It requires a good deal of preparation before use, such as finding out how records are delimited in your source file and so forth. I have persuaded it to create databases out of everything from *View* macros (the opposite of Macro!) to corrupted ASCII text files. It asks you nearly 20 questions before it goes off to process your file, and I find it hard to imagine any format which it couldn't cope with. Several examples, dBaseII among them, are included in the manual. It's not fast but it's a blessing for anyone who is already using other database systems.

Finally, the Report utility is a simple pretty-printer which works in very much the same way as macros do in *View*, ie, fill in the blanks. Headers, repeated on every page, are supported as are both textual and numeric blank-filling. Basic arithmetic is permitted, and two levels of registers are available for performing sub-totalisation. Using these registers *ViewStore* will print out sub-totals each time the value of a specified field changes, producing neatly formatted listings with totals in places one might instinctively put them – a very nice touch.



**A record-type definition menu**

## Conclusion

*ViewStore* is a fairly comprehensive database management system, and it fits loosely but tidily into the network of data transfers within the *View* family. It is certainly the most comprehensive database management system available for Acorn equipment that I have encountered, but it still has a long way to go before we can compare it with some systems for other machines – still, what can you expect for several hundred pounds less?

Using *ViewStore* on the Econet is a complete write-off unless you have ANFS or are using a file server from SJ Research. The reason for this is beyond the scope of this review, but it has to do with the history of the Econet software. I strongly suggest you try it out before you buy it for network use, particularly as Acorn currently has no information on when the ANFS will be released.

If you are lucky enough to have an ADFS disc system, either floppy or hard, *ViewStore* is very much easier to use. Using it with the DFS is a chore which should really be reserved for misers and masochists.

*ViewStore* is not fast, but if you trade this off against its sophistication I think you'll agree that it's excellent value for money.

*ViewStore £59.80 inc VAT*

*Acornsoft, 645 Newmarket Road, Cambridge CB5 8PD. Tel: (0223) 214411*

SOFTWARE

# MAKE-UP FOR MORTALS

**Tony Quinn relives the joys of working on newspapers in the first of two reviews of publishing software**

Two names have been on everyone's lips for the past six months: Mirrorsoft's *Fleet Street Editor* and *Pagemaker* from Advanced Memory Systems (now in a 'Super' version which doesn't need the AMX Mouse chip). I'm going to deal with these in two parts, with *Fleet Street Editor* coming first and the AMS offering next month. They both have major failings which decry their ability to achieve their claims, but I have no doubt that they are a major step in software publishing, and it is yet another tribute to the quality of the BBC micro that they appear on it first.

*Fleet Street* calls to you through advertising pages with 'professional-looking printed materials' and the jargon of newspapers. AMS waxes just as lyrical with 'a revolutionary software program that will produce newspapers . . . to an extraordinary professional standard.' The adverts then go on to quote words like 'phenomenal' and 'outstanding' from an *Educational Computing* review.

So, after reviewing the hype, what are the programs really like? First, they are both restricted to an A4-size page (the size of this magazine), and I'm still waiting for a paper from Murdoch, Shah, Maxwell (under whose wing Mirrorsoft lives), or anyone else which is that small. Next, they both suffer from appalling typefaces, the standard of which takes me back four years to the crude styles of early printers, because text has to be handled in the same way as graphics. This means neither can use the near letter quality (NLQ) typefaces of today's printers, which is a pity.

## The set-up

Before you turn to the Advertising Standards Authority, let's go through the capabilities of *Fleet Street*. The software was written for Mirrorsoft by Clares, a company renowned for programming through its many utilities. The manual is an A5 ring binder with a folder containing two discs (which are a tight fit in a plastic wallet) and a function key strip neatly tucked into the back. This is a big advantage over *Pagemaker*, as you can literally put *Fleet Street* in your pocket. No ROMs are needed, and the program can be controlled from keyboard or joystick – but not from a mouse.

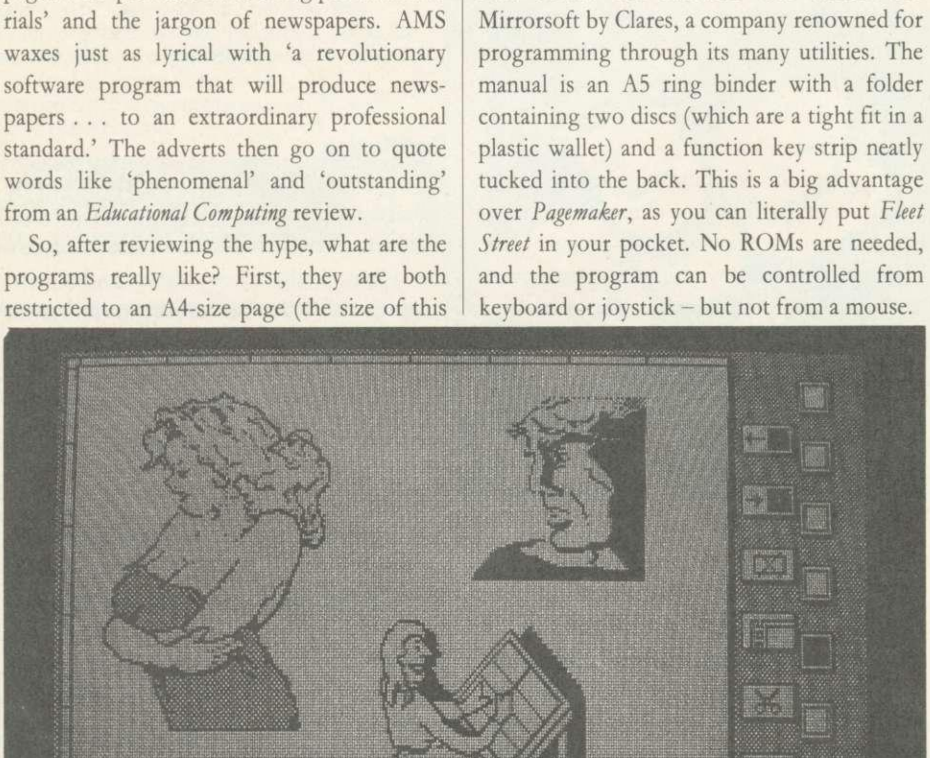



**Figure 1. One page out of the 42 in the graphics library. I took the woman for the 'Stun' page, and loaded her into the Studio (figure 3). Here I added a background, changed her face and added the headline text**


FLEET STREET EDITOR

First Edition

To a son of the sun in the Sun

Tie me kangaroo down sport, tie me kangaroo down. This message is for Doug who came from the real sun to the Covent Garden Sun, and so occasionally has to go back to the sun. For Doug is a son of the Australian sun, and now rarely the sun does he see.

SENSATION!

NEW PUBLISHING EMPIRE LAUNCHED

FOR ONLY £39.95

TYCOON

With the purchase of this package, this latest tycoon of the publishing world has launched a new and exciting era of news presentation.

Leader

The new owner has written the leader at the top of this column and this shows the skill which is going into this publication.

The written word will never be quite the same again!

Fleet Street Editor

The package is the latest from

MIRRORSOFT

and it opens up the world of personal publishing to the wise purchaser. All you need is a BBC micro, a disk drive, and printer. It will allow users to produce professional-looking printed products from simple news-sheets or notices to multi-page news-letters and posters and it's all in one package!

DEPARTMENTS

The six distinct stages of any print production process are represented by the six 'departments' in the program. Graphics Library, Studio, Copydesk, Page Make-Up, Preview and Print, and Administration Department.

Following these stages with the assistance of the comprehensive illustrated manual users can blend words and pictures created within the program or loaded in from external files such as View, Wordwise, AMX mouse, etc. to produce printed materials for a wide variety of applications.

WATCH OUT!

Now your new career in electronic publishing is launched you'll need to watch out for the Fleet Street Editor add-on packages in order to stay ahead of the field. New facilities, new fonts and new Graphics Libraries are all on the way. Let us keep you informed about the goodies to come by filling in and sending off your Registration Card now!

Happy Publishing from Mirrorsoft

**Figure 2. Result of using the 'guided tour' files. All the material except the 'Groucho' panel is provided. The banner is a 'stretched' panel**

The manual is well-written, indexed, and full of diagrams, but it has some annoying characteristics. The first is a mass of pages on topics like newspaper and computer jargon and worthy but wordy chapters on the publishing process.

I don't think I'm alone in wanting to get to the nitty gritty, rather than skim through what I already know. Of course the package is complex and sophisticated, so you have to read something to get going, but it would be good to show people in a more obvious way which bits are and are not vital.

The numbering system for pages and paragraphs can be a bit confusing, but it's been done this way so that Mirrorsoft can send out new or corrected pages without having to renumber the whole manual.

The first thing to do is to tell the system disc what sort of computer set-up you have – printer, disc drives, etc. In doing so, you have to learn a new set of disc jargon because *Fleet Street* uses 'flippy discs' which you actually have to turn over. This might be confusing for less-experienced users, but Mirrorsoft assured me they had had no problems. I got my system set up wrong the first time, but it's not hard to

do it again. My advice to the uninitiated is to find someone to help you. You then prepare some 'user discs' with a very handy format and verify utility.

Once the system is set up properly, your best bet is to go through the 'guided tour' where most of the work is already done for you. You create one panel out of the eight which make up a page.

### The guided tour

The tour introduces you to each of the five elements in the system: graphics library, studio, copydesk, page make-up and preview/ print. It works like this: you enter the library (figure 1), select one of the 200-odd standard graphics (I chose Groucho) and save it to disc.

You then enter the studio, load in the saved graphic, play around with it by expanding the size (I doubled the height), and save it to disc. There are many other goodies in the studio, allowing pictures to be altered and even creating your own from scratch, but I'll come to these later. Note, though, that pictures can't be

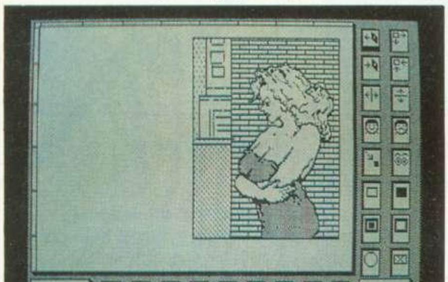


**Figure 3. The studio for creating or altering pictures and headlines. Icons choose pens and fills, disc, copying and rotating facilities and pixel editor**

loaded in straight from the library.

You now leave the art department and enter the copydesk. Here you load in the saved graphic, and put words and headlines around it. The words part of the package I found disappointing, as the text editor is crude compared to a wordprocessor (*Pagemaker* doesn't have one at all) and you can only get 32 characters (about five words) onto a panel line and there are just 23 lines to a panel. This means lots of white spaces when you justify text. The typeface is poor, being based on an eight-by-eight matrix, whereas printers use at least nine by seven.

You then save your text and graphics which is by now a fully-fledged 'panel' – the time has come to enter the page make-up area where the



Stun

No.1 FORWARD WITH BOB 26 Feb

BINGO JINGO with Jane

ANDY'S EX-GIRL IN BATH SHOCK

Brown:fast exit

by Michael O'Shea

PRINCE ANDREW'S former model girlfriend, 27-year-old blonde Sarah Brown, narrowly escaped death yesterday when her bathroom caught fire.
Sarah had to flee her £85,000 flat as flames engulfed the building after a TV set caught light.
As our exclusive photograph shows, she escaped wearing just a towel, and was bundled into a patrolling car from the royal security squad.
A spokesman from Westminster Hospital where Sarah was taken said: 'She is just a little shaken after the car ride and will be kept in overnight.'

To a son of the sun in the Sun

Tie me kangaroo down sport, tie me kangaroo down. This message is for Doug who came from the real sun to the Covent Garden Sun, and so occasionally has to go back to the sun. For Doug is a son of the Australian sun, and now rarely the sun does he see.

FLOOK with apologies to Trog and Keith Waterhouse



**Figure 4. 'Stun', the result of about a day's work on Fleet Street. All eight panels were done from scratch, apart from Sarah Brown and Groucho from the Graphics Library. Note that the horizontal rules cannot be carried across the central 'gutter' between the panels: the vertical rules do join up, though**

designed panel is put in position on the page. Once this is done you have a completed 'page' so you save it to disc.

Finally, you leave make-up, and enter the print section. The page is loaded back in and can be previewed, which gives you a rough idea of how it will finally look (it's about half-size). Previewing takes about a minute and a half, and if you're happy, printing takes another three minutes. At last you have a printed page – my effort is figure 2. Now if that sounds convoluted, let me confirm that it is – I would be astounded if anyone got it right first time. And if you have printer problems (as I did with a Mannesman Tally MT85 which has to have a line feed set up), you have to go all the way back to the set-up stage!

After working my way through the tour and having a go with the studio, I realised the system just didn't seem to agree with me.

# The XLtron MEGA•BOX

## from XLTRON Ltd.

The MEGA BOX is a top quality rigid plastic storage box with see-through lid and four dividers. Holds up to 60 diskettes.

With RHINOKOTE – it's tough!




Measures 6¼″×8¾″×6½″

**All disks are 5¼″ and feature:**

- **Write protect notch**
- **Hub rings**
- **Double density (D/D) suitable for single density (S/D)**
- **Tyvex sleeves**
- **Full set of labels and write protect tabs**
- **Meets all ANSI specifications**

## XLtron Floppy Disk Prices

**25** SS/DD disks in **MEGA•BOX** £26.97 plus £2 p&p = **£28.97**
**25** DS/DD disks in **MEGA•BOX** £30.34 plus £2 p&p = **£32.34**
**50** SS/DD disks in **MEGA•BOX** £47.45 plus £2.50 p&p = **£49.95**
**50** DS/DD disks in **MEGA•BOX** £53.38 plus £2.50 p&p = **£55.85**
**10** SS/DD disks in **MINI•BOX** £9.45 plus £1.50 p&p = **£10.95**
**10** DS/DD disks in **MINI•BOX** £10.63 plus £1.50 p&p = **£12.13**

### REDUCED PRICES FOR '86

Note the difference!
The 'middle man' is out. XLTRON Ltd has taken over direct distribution and drastically lowered prices. Quality still the highest – prices still lowest.

5¼″ HD's – Call
3½″ HD's – Call
3″ HD's – Call

### NEW NEW NEW MEGA•PAK

**25** SS/DD disks in a **MEGA•PAK** £21.00 plus £1.50 p&p = **£22.50**
**25** DS/DD disks in a **MEGA•PAK** £23.63 plus £1.50 p&p = **£25.13**
**25** SUPERDISKS in a **MEGA•PAK** £26.58 plus £1.50 p&p = **£28.08**

**ALL PRICES INCLUDE VAT**

## SUPERDISK

XLTRON's 96 tpi (80 track) disk

Suitable for any disk requirement or use. Individually tested and certified in our London laboratory.




**10** in a **mini•box** £11.96 plus £1.50 p&p = **£13.46**
**15** in a **midi•box** £20.88 plus £1.50 p&p = **£22.38**
**25** in a **MEGA•BOX** £34.14 plus £2.00 p&p = **£36.14**
**50** in a **MEGA•BOX** £60.05 plus £2.50 p&p = **£62.55**

**XLTRON LTD.,
BJ House, 10-14
Hollybush Gdns,
London E2 9QP England.**

## Suitable For Most Popular Micros

XLTRON disks are recommended for BBC, IBM PC Atari and Commodore computers. If you need advice on other micros just ring 01-729 3363.

## Our Quality Promise

You can order with confidence. We buy disks from international manufacturers to our specifications, then test, retest and grade them in our London laboratories.

## Fully Guaranteed

The XLTRON quality control is so stringent that we can give our famous 'two for one' guarantee. If you find a faulty disk, return it to us, and we'll send you two in exchange immediately. All part of our five year guarantee.

## Personal Callers Very Welcome

We're now established in our new showroom in Hollybush Gardens. You can save our £2 delivery charge by calling in – you'll be welcome weekdays from 10.00am till 5.00pm.

## Help Lines 01-729 3363 (3 lines)

If you want help or information to place an order just ring our 'help' lines.

## Official Orders

We accept orders from all government bodies, schools, universities, libraries, armed forces etc. We despatch on receipt of an official purchase order. If you can't raise a cheque without an invoice, just post or telephone your order and we'll send you a pro-forma by return.


© TYVEX is a registered name of Du Pont.
© Rhinokote is a registered name of Rhino Magnetics Ltd.
© XLTRON is a registered name of XLTRON Ltd.


**To: XLTRON Ltd., BJ House, 10—14 Hollybush Gardens, London E2 9QP England**
Just fill in the coupon or send your order on a postcard or letter. Or phone your order on 01-729 3363.

Please send me the following, (tick the appropriate boxes):

____ ____(QTY) ☐ SS/DD ☐ DS/DD ☐ SUPERDISK disks in a

☐ **MEGA•BOX** ☐ **MEGA•PAK** ☐ **mini•box**

I enclose a cheque/p.o. for £________ or debit my Access *(All prices include VAT)*

card no. ________________

Name: ____________ Signature: ____________

Address: ________________

Postcode: ________

(Block Capitals Please)

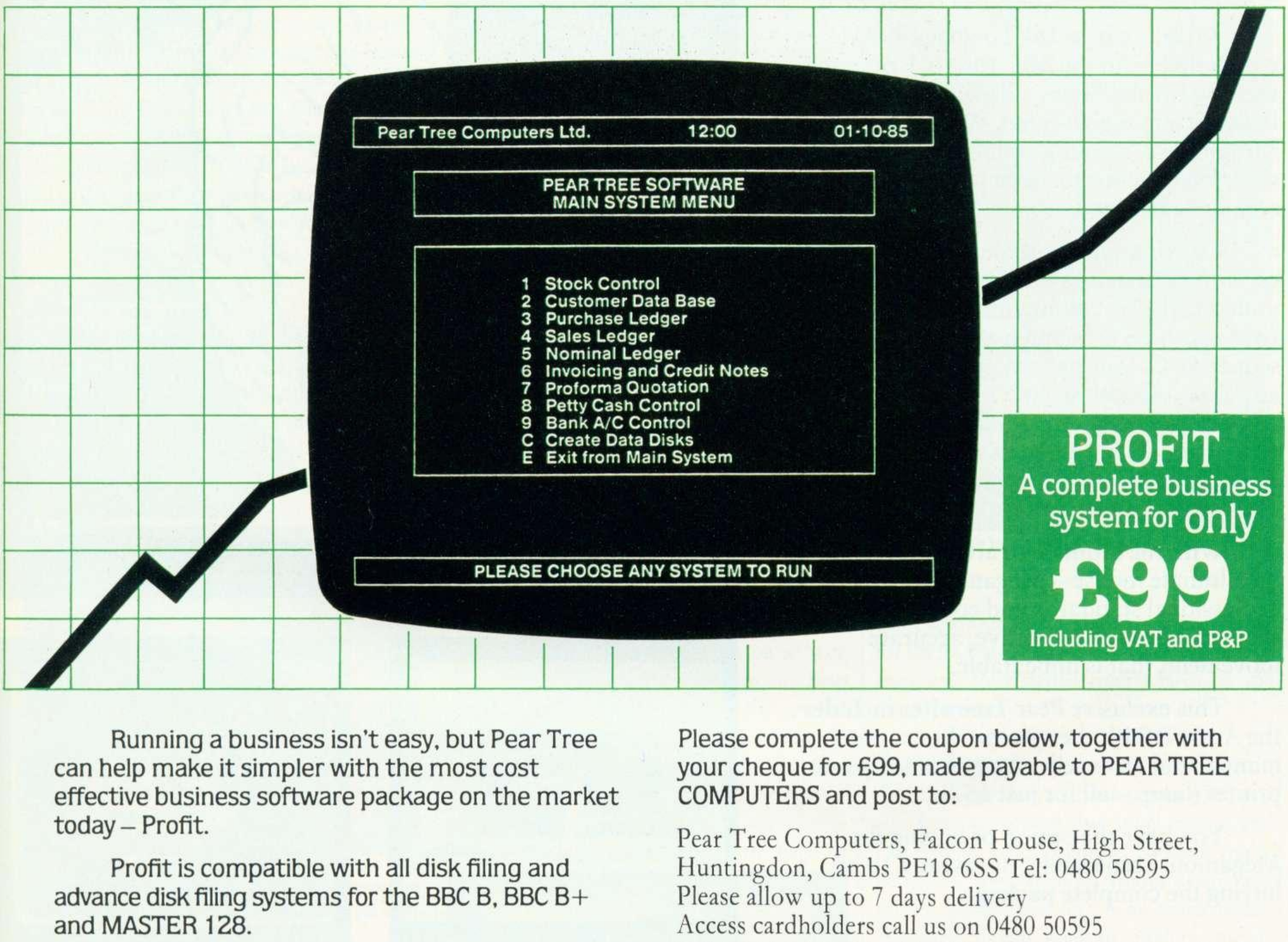
AU5

SEE REVIEW IN THIS MAGAZINE

*PEAR TREE...*

# Means Business

**The first complete, integrated business package for the BBC Micro**




Running a business isn't easy, but Pear Tree can help make it simpler with the most cost effective business software package on the market today – Profit.

Profit is compatible with all disk filing and advance disk filing systems for the BBC B, BBC B+ and MASTER 128.

Developed for Pear Tree's own compatible KBL 128 PC, Profit is an easy to use as a, b, c. Everything you require in running a business is there – accounts, stock control, customer data base and even the immediate status of your bank account.

With Profit, all the time consuming problems, the reams of paperwork and valuable hours taken in administration can all be condensed down far more efficiently. The net result is that you have far more time to concentrate on making your company grow.

Profit is simply a way to help you control your business more profitably. Complete the coupon today and start to profit from the software designed for your business.

Please complete the coupon below, together with your cheque for £99, made payable to PEAR TREE COMPUTERS and post to:

Pear Tree Computers, Falcon House, High Street, Huntingdon, Cambs PE18 6SS Tel: 0480 50595
Please allow up to 7 days delivery
Access cardholders call us on 0480 50595

Please send me ______ Profit Software Packages @ £99 each. I enclose my cheque

value £ ______

My computer system is ______

Name ______

Company ______

Address ______

______

______

Tel ______

PEARTREE COMPUTERS

# The black and white case for colour

Pear Tree are now offering the most powerful art package yet devised for the BBC Micro – Artist.

Artist is a new 16k language ROM compatible with the BBC Micro, BBC+ and the new Master Series, allowing full manipulation of a mode-2 screen. With Artist and Megamouse, colour graphics take on a completely new dimension, which has to be seen to be believed.

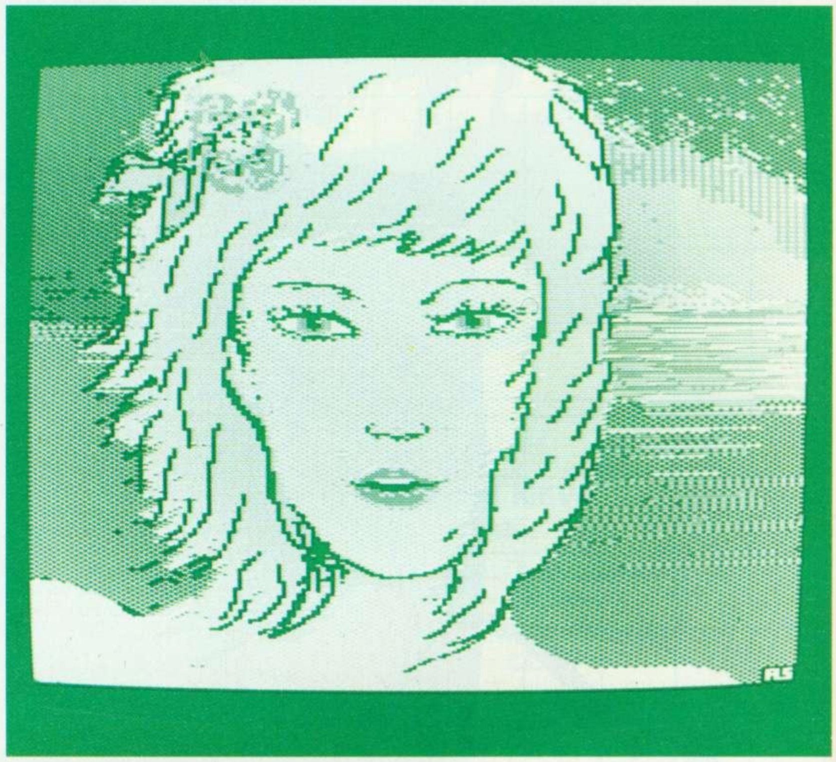
Copying specific screen areas to exclude certain colours. Drawing and painting underneath any colour combination. Making your brush cycle through a defined colour sequence. Colour pattern editing. Sprites of any size. Animation. Just a hint of how Artist is the most highly advanced software package yet designed, with features never before seen on the BBC Micro. The only limitation of Artist is your imagination.

With the ultimate in art packages comes the ultimate mouse – Megamouse. Built to professional standards and comfortably shaped, it provides sensitive, accurate movement, that is unbeatable.

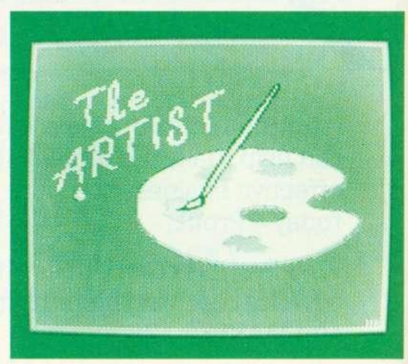
This exclusive Pear Tree offer includes the Artist ROM, the systems disc, a users manual and an excellent grey shade Epson printer dump – all for just £55.

You have the option of buying the Megamouse separately, or saving £10 by buying the complete package.

Artist is already ahead of its time. Don't be left behind – order now before it's too late.









I enclose my cheque for £ ________ made payable to Pear Tree Computers. I understand delivery will be made within 14 days. Please send me:

______ Artist Pack only @ £55 ____________

______ Artist Pack including Megamouse only @ £99 ____

______ Megamouse only @ £55 ____ TOTAL ______

Name: ____________

Company: ____________

Address: ____________

Access cardholders – call us on 0480 50595

PEARTREE COMPUTERS

PEAR TREE COMPUTERS
Falcon House, High Street, Huntingdon,
Cambs PE18 6SS Tel: 0480 50595

## SOFTWARE

There are niggling little things, as with any software, but there are some fundamental design decisions which annoyed me. One was the laborious way of saving pictures. There are different ways of saving for the sections you visit and each one has several stages.

Readers who use wordprocessors will appreciate the need for regular saving of text in case of pressing Break accidentally, or losing power, but *Fleet Street* makes this a real pain: it's complicated and time-consuming. For example, if your graphic fills the whole screen, it's a real art framing it for saving, and if you go outside the page area you have to start again. There is no default for saving the whole screen, which there should be to encourage regular saving.

The idea of using panels is quite simple, but limiting. Each panel is a set size, so if your page design doesn't neatly fit into eight parts you are in for some trouble. I had this problem in creating the 'Stun' page, where I couldn't join up the rules to make the box (figure 4). Of course it's easy to draw in with a pen on the




**Figure 5. The Groucho panel has been taken from the studio to the copydesk, where the words are added. Note the choice of type fonts in the top right**

printout afterwards but goes against the grain. Another limiting factor is that the package only allows two columns of text (*Pagemaker* allows more). Going back to the newspaper analogy, show me a paper working to this rule! However, I found out later that Mirrorsoft had worked out a way to do it by setting up a graphic for each half of a panel, and writing over it in the copydesk.

By getting to know *Fleet Street*, I'm sure many of these limitations will become 'features', and in time ways around them will be found – for which the promised newsletters will be vital. Mirrorsoft is also set to bring out three support discs by May. One will contain extra graphics, a text font editor and 10 more fonts; the second will be full of Walt Disney

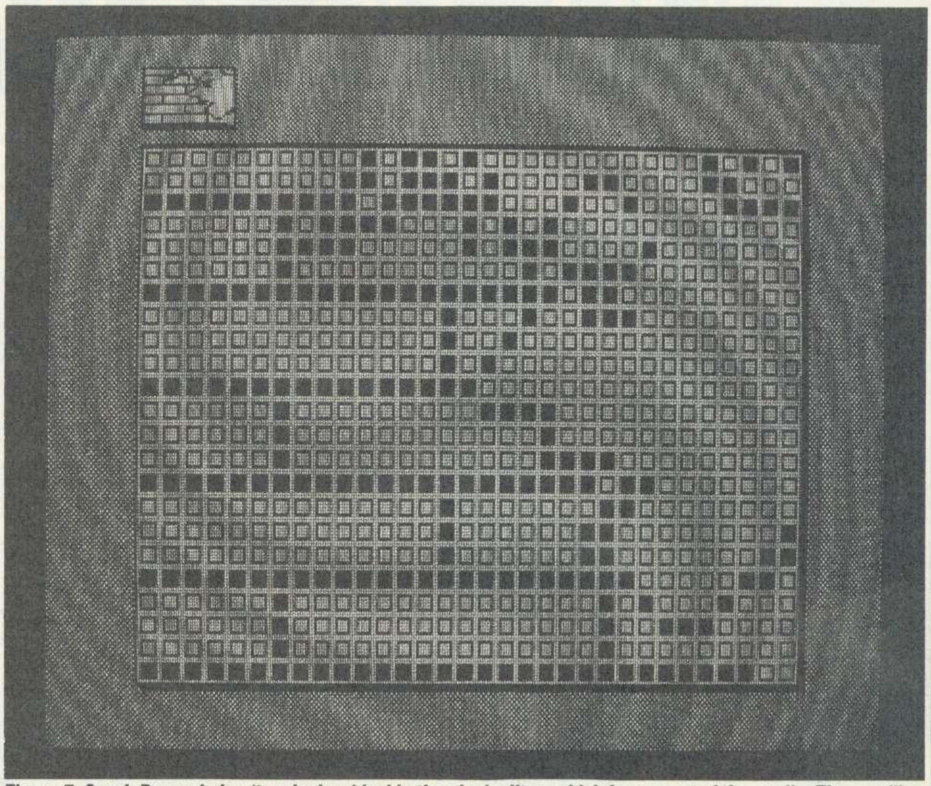


**Figure 7. Sarah Brown being 'touched-up' inside the pixel editor, which forms part of the studio. The scrolling on this has to be seen to be believed**

characters; while the third will be a utilities disc. Mirrorsoft is also working on a 'wire room' with the package linked to a cheap picture digitizer and modem. It is this level of support from Mirrorsoft (and third parties I imagine) that will really get the package going.

With all this in mind I set out to put the system through its paces by doing a mini tabloid front page, and the 'Stun' page of

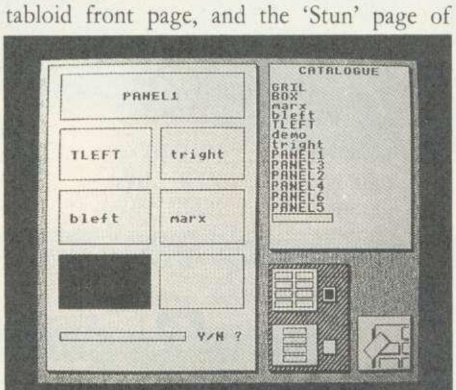



**Figure 6. Page make-up: panels are pulled in to make a page. The Y/N question refers to whether the panel is to be 'stretched', as in figure 1**

figure 4 was the result. The girl was taken from the library and touched up – she originally had a chin like Frank Bruno – using the excellent pixel editor (figure 7) in the studio (the scrolling speed has to be seen to be believed). The background was added to form the picture for the lead story. I used Groucho for a second story and then started from scratch on the Flook cartoon.

### The end result

The end result is neat and impressive, but is it any better or quicker than using scissors and paste? With long documents I reckon you're better off with a good wordprocessor and printer because the text is so much better. However, if you want to produce one-off leaflets with lots of graphics you can have a great deal more fun with *Fleet Street*, produce very clean pages and it's an impressive package for £40. The graphics library and studio are worth using as an addition to cut and paste.

Next month I'll tackle *Super Pagemaker* from AMS with their Mouse and give a final summing up of the merits of these two publishing packages. We look forward to seeing the results readers can achieve with *Fleet Street* and *Pagemaker*.

*'Fleet Street Editor', Mirrorsoft, BBC B/B+/Master, £39.95 (two 40/80 discs). Keyboard/joystick compatible. 'Pagemaker Plus', Advanced Memory Systems, BBC B/B+, £49.95 (two chips, two 40/80 discs). Keyboard/joystick/AMX Mouse compatible – see the detailed review in next month's issue*

# Torch mail order price breakthrough

## 1986 SPECIFICATION TORCH UPGRADES, DIRECT FROM THE MANUFACTURER AT SPECIAL MAIL ORDER PRICES.



**Mail order price £229**
**including VAT**

### ◀ ZEP 100
**Z80 extension processor**
Free software and carry case.

### ZDP 240 ▶
**Twin floppy discs and Z80 processor**
Runs BBC-MOS and CP/M compatible software using high quality, double-sided 400K disc drives. Allows storage for BBC DFS and CP/M programs.



**Mail order price £549**
**including VAT**




**Mail order price £1,999**
**including VAT**

### ◀ HDP Z80
**Hard disc, floppy disc and Z80 processor**
Adds a massive 20 Mb of hard disc storage, ideal for small business and education environments.

### Torch Graduate ▶
**The only IBM compatible upgrade for the BBC Microcomputer**
MS-DOS O/S, 8088 16-bit processor, 256K RAM plus twin 360K disc drives.



**Mail order price £579**
**including VAT**

The official range of upgrades for the BBC Model B Microcomputer now has an even higher specification and a price tag lower than ever before. Better O/S firmware, improved utilities, new user guides plus free software with all models.

Complete the order form today or telephone (0223) 841000 with your VISA/ACCESS card number.

Torch Z80 owners send a cheque for 1986 upgrade pack, only £29.95 including VAT and P & P.

**TORCH COMPUTERS**

Torch Computers Ltd., Abberley House, Great Shelford, Cambridge CB2 5LQ.
Tel: (0223) 841000

To Torch Computers Ltd., Abberley House, Great Shelford, Cambridge CB2 5LQ.

| | | Unit Cost | Total | Please tick |
|---|---|---|---|---|
| Quantity ______ | ZEP 100(s) | @ £229.00 | £ ______ | Model B ☐ |
| Quantity ______ | ZDP 240(s) | @ £549.00 | £ ______ | Model B + ☐ |
| Quantity ______ | HDP Z80(s) | @ £1,999.00 | £ ______ | |
| Quantity ______ | Torch Graduate(s) | @ £579.00 | £ ______ | |
| Post and packaging £19.50 per order | | | £19.50 | |
| Cheque enclosed for | | TOTAL | £ ______ | |

or charge my Access ☐ Visa ☐

Card No. ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Signature ______________________

Name ______________________

Address ______________________

______________________ Tel: ______________________

Allow 28 days for despatch of goods.

The Graduate is manufactured by Torch Computers under licence from Data Technologies Ltd. Product names referred to are trademarks of the companies of origin. AU5

MAIL ORDER FOR A LIMITED PERIOD ONLY

# CAREY ELECTRONICS

**computing and communications**

For The BBC Microcomputer System – computers peripherals software

| | | | |
|---|---|---|---|
| **THE ACORN BBC "MASTER SERIES"** | | **ALL SOLIDISK PRODUCTS AVAILABLE** | |
| MASTER "128" | 499.00 | Acorn 1770 DFS | 49.95 |
| MASTER "TURBO" | P.O.A. | Acorn ADFS ROM | 29.99 |
| MASTER "12" | P.O.A. | **MONITORS** (14" R.G.B.) & (12" Mono): | |
| MASTER "SCIENTIFIC" | P.O.A. | Microvitec 1431 (Std. Res.) | 249.00 |
| MASTER "ET" Econet Terminal | 399.00 | Microvitec 1451 (Med. Res.) | 299.00 |
| "MODEL" B accepted in Part Exchange | | Philips BM7502 (12" Green) | 87.95 |
| **PRINTERS** | | **COLOUR PRINTERS** | |
| CANON PW-1080 A | 329.19 | CANON PJ-1080 A | 499.00 |
| EPSON FX-80 | 503.00 | JUKI 5520 | 516.00 |
| EPSON LX-80 | 283.00 | INTEGREX Colourjet 132 | 654.35 |
| JUKI 6100 | 399.00 | Plotmate A4 PLOTTER | 343.85 |
| SHINWA CPA 80 | 228.00 | UPGRADE TURBO 64K BUFFER | 161.00 |

| | | | |
|---|---|---|---|
| **SINGLE DRIVES (without P.S.U.):** | | **DUAL DRIVES (without P.S.U.):** | |
| 40/80T. D/S. 400K. | | 40/80T. D/S. 2 × 400K. (800K) | |
| Pace PSD 3 | 129.84 | Pace PDD 3 | 244.95 |
| Akhter/UFD MD400 A | 124.95 | **DUAL DRIVES (all with P.S.U.):** | |
| **SINGLE DRIVES (all with P.S.U.):** | | 40/80T. D/S. 2 × 400K. (800K) | |
| 40/80T. D/S. 400K. | | Pace PDD 3 P | 289.80 |
| Pace PSD 3 P | 157.55 | Akhter/UFD MD 802 E | 294.95 |
| Akhter/UFD MD400 B | 154.95 | Akhter/UFD MD 802 D | 324.95 |

★ **All drives include cables, formatting disk & instructions** ★

***BABT approved Modems** by **Acorn Pace Miracle Technology & Tandata***

| | | | |
|---|---|---|---|
| Pace Nightingale | 136.85 | Pace "COMMSTAR" | 34.00 |
| Tandata range from | 116.15 | Tandata "TAN-ROM" | 56.35 |
| Miracle WS 2000 | 129.95 | Miracle "DATABEEB" | 28.75 |
| Miracle WS 3000 from | 339.25 | Acorn "PRESTEL" Adapter | 139.00 |

It's **AFTER** the **SALE**, that **SERVICE** counts!!

**ALL PRICES INCLUDE V.A.T.** **DELIVERY POST FREE U.K. MAINLAND**

MAIL ORDERS TO: (Callers by appointment).
7 Church Road, WALTON-ON-NAZE, Essex C014 8DF.
Tel: Frinton-on-Sea (02556) 6993.

AA5B



**The 1st choice**

# EXPRESS BBC REPAIRS!

BBC repairs between £14 and £45.

## WHY PAY HIGH 'FIXED' PRICES

(We do not charge you for our fancy premises by charging high 'fixed' prices!)

Reputations take time to build, we have been repairing ZX 81's, Spectrums, QL's, Apples and BBC's professionally, for 2½ years – who is coming second?

**BBC engineers wanted – URGENT**

1st FOR PROFESSIONALISM – "Of all the repair companies 'Sinclair User' spoke to, **MANCOMP** seemed the MOST PROFESSIONAL when it came to advice and a helpful attitude" AUG 85.

1st FOR HONESTY – We let you watch your computer being repaired and if there is nothing wrong with it, we will tell you!!!

1st FOR REPUTATION & HELPFULNESS – "I have come across a firm that will be more than willing to advise you as to how to remedy your problems. They are called **MANCOMP** and as well as repairing faulty computers, are also quite willing to discuss your problems with you and offer reasonably cheap and more importantly CORRECT CURES" Phil Rogers POPULAR COMPUTING WEEKLY JAN 85.

Every parcel sent by Royal Mail Receipted Post and insured for return journey!
(For next day delivery include £1.50 extra).
(Securicor by prior arrangement).
On-site maintenance for Apples, I.B.M.'s and most makes of printers also available.
**Guaranteed** 4hr response!

WHY DELAY – OUR ESTIMATES ARE FREE AND WITHOUT OBLIGATION. IF YOU DO NOT LIKE OUR ESTIMATE WE WILL RETURN THE COMPUTER AND REFUND THE POSTAGE INCURRED!

**MANCOMP LTD**
**(Dept. AU5)**
Printworks Lane, Levenshulme, Manchester M19 3JP
Phone 061-224 1888.
OR 061-224 9888.
OPEN MON - SAT 9am to 7pm

EXTRA-SPECIAL DISCOUNTS FOR EDUC INST., H.M. FORCES, CHARITIES, HOSPITALS, ETC!

Hardware and software design probems? Contact us for the complete service, from design through to manufacture.

What we do today . . . others do tomorrow!

**NOTE OUR PRICES AND WATCH OTHERS FOLLOW THE LEADER**



FREE MICROLINK REGISTRATION WITH EACH MODEM SUPPLIED

# DEMON modem

NOW AVAILABLE AT ONE HELL OF A PACKAGE PRICE FOR THE BBC MODEL B MODEM + BBC ROM only **£79.95** plus VAT + p&p

AA126




## DEVILISHLY CLEVER FEATURES

**Auto Answer**
The Demon answers, then unloads or downloads data into your micro and printer just like a telex.

**Auto Dial**
Numbers dialled by the micro. Doesn't even need a telephone attached.

**Auto Redial**
The dial disk allows you to set your favourite numbers and keeps dialling until you are connected.

**Full U.K. European & USA**
CCITT V21 & V23 Bell 103 & 202

**Baud Rates**
300/300 Bulletin Boards, etc.
1200/75 Prestel, Micronet, etc.
75/1200 Reverse Prestel, etc.

**Bulletin Board Facility**
Start your own contact information boards throughout the world.

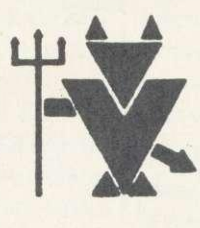
**PSS**
Packet Switching Service lets you dial worldwide databases for the cost of a local call.

**Complete with Plugs + Leads**
For telephone, BBC 5 pin DIN RS423 and mains power supply.

**EASY TO USE?**
You don't need to know anything about baud rates or protocol or 'handshaking' simply plug it in and talk to the world.

**Direct from the Manufacturer**
By selling it directly we are able to offer it at this low price and still give you support should you need it.
We also have complete control of the quality and build it to the same standards as the products we supply to BT and whilst this modem is not yet BT approved the components we use are.
We also offer a money back guarantee now extended to 12 months for registered users.

PROHIBITED from direct or indirect connection to public telecommunication systems. Action may be taken against anyone so connecting the apparatus.



To: Walkbury Consultants, (Modem Dept 1), Unit 1, Alfric Square, Woodston Industrial Estate, Peterborough PE2 0JA. Tel: Peterborough (0733) 235187.

Please send me:

. . . . .(Qty) Demon Modems plus Demon BBC Rom at (£94.95)
. . . . .(Qty) Demon Dial Disk at £4.95
. . . . .(Qty) Demon Adaptors (allows telephone and modem to plug into same socket) at (£5.25)

I enclose a cheque to the value of £ . . . . . .

or [card] No. . . . . . . . .

Signature . . . . . . . .

Name . . . . . . . .

Address . . . . . . . .

. . . . . . . .

Post code . . . . . . . . (please print)

## SOFTWARE/ROMS

# FOUR PLUSES FOR WORDWISE

**Patrick Quick looks at four utility packages for *Wordwise Plus***

Since *Wordwise Plus* was published last year more and more 'segment programs' (or sprogs) have appeared in magazines and many users have written their own. They are easy to write and can be very useful, so it was only a matter of time before packages of utility sprogs were published. This review covers four such packages, three on ROM and one on disc. Watford Electronics' *Word-Aid* ROM and Beebugsoft's *WordEase* disc each offer a mixed bag of general-purpose utilities with no strong theme. Norwich Computer Services' *Continuous Processing ROM (CP-ROM)* contains a suite of sprogs aimed specifically at making it easier to spread a document over several disc files. Interface Electronics' *Wordwise++* ROM is different. Its main offering is extra string handling commands for *Wordwise Plus*, programmed in machine code, but it also includes a few general sprogs for good measure.

### WordEase

This 40/80 format disc contains around fifteen different utilities, selected from a menu. The range is wide and many are good and well-programmed with plenty of user-friendliness and flexibility, but one or two are a bit too slow to be useful. I am already using the 'auto version save' for this review, and the label printing and mail-merge look flexible. The 'section renumbering' automatically handles numbered paragraphs of the 5.3.1, etc, format and also amends all cross references to paragraphs. I don't know how useful this is likely to be to you but I don't use that type of numbering and if I did it would probably be on a document too big to fit in memory.

Beebug has the advantage over the others in offering its product on a disc, which allows a lot more space for messages and clear prompts and a wider range of routines (*WordEase* fills about 32k of the disc). It was also fairly easy to add my own routines into the menu structure, especially after using *WordEase* to expand the abbreviated keywords in the menu sprogs. I can see myself using this package as the basis of my own compilation of sprogs. A poorer decision made by Beebug was to put the main menu in segment 9. Pressing Shift/f9 all the time is a bit dangerous for my liking, f9 being so close to Break. I did, though, like the fact that Beebug clearly states that users can make one backup copy of the disc for their own use.

### Word-Aid

Like *WordEase* this package offers a selection of sprogs, but this one's in a 16k ROM which rather limits the space available. Slightly fewer options are given and many are trivial and inflexible. The printer codes, label print and mail merge are inferior to the ones from *WordEase* and the continuous processing options come nowhere near the sophistication of Norwich's ROM. The only things that scored over the others were the multi-copy printing routine (I had already written one myself and can't imagine why everybody else left this out) and the sorting facility. Overall I found *Word-Aid* insubstantial – I would want something much more impressive before sacrificing a valuable ROM slot or the cash, especially as on ROM you cannot make even minor amendments to the routines. I have just noticed that Watford is offering *Word-Aid* free with *Wordwise Plus* in their January 1986 advertisement – at that price I suppose it's not bad.

**COMPARISON TABLE**

| | Word-Aid | WordEase | CP-ROM* | WW++ | WW++ disc |
|---|---|---|---|---|---|
| Compact sprog | — | 3 | — | 3 | 3 |
| Analyse sprog | — | 3 | — | — | 3 |
| Text transfer | 3 | 3 | — | — | 4 |
| Clear segment/text | 3 | — | — | — | P |
| Display variables | — | — | — | 2 | P |
| Show seg/text status | — | 1 | — | — | — |
| String functions | — | — | — | 5 | — |
| Printer codes | 3 | 3 | — | — | P |
| Multiprint | 3 | — | — | — | — |
| Printer symbols | — | 3 | — | — | — |
| Stored page layouts | — | 1 | — | — | — |
| HR1 exclamation | — | — | — | 1 | P |
| Continuous proc: select | 3 | — | 5 | — | — |
| Continuous proc: print | 3 | — | 4 | — | — |
| Address finder | 2 | — | — | — | — |
| Label print | 2 | 4 | — | 2 | P |
| Mail merge | 2 | 3 | — | 2 | P |
| Basic line numbers | 3 | — | — | — | P |
| Split Basic lines | — | — | — | 3 | — |
| Disassembly labels | — | — | — | 4 | P |
| Auto-version save | — | 4 | — | — | 5 |
| Disc menu | — | 3 | — | 3 | 3 |
| Function key edit | — | 3 | — | 2 | P |
| Renumber sections | — | 4 | — | — | — |
| Align numbers | — | 1 | — | — | — |
| Sorting | 4 | 3 | — | — | P |
| Mark chapter | 1 | — | — | — | — |
| Search and replace | 3 | 3 | 3 | — | — |
| Remove embedded cmnds | 3 | 3 | — | — | P |
| Alter preview mode | — | — | — | 1 | — |
| OVERALL | | | | | |
| Ease of use | 2 | 3 | 4 | 4 | 3? |
| Facilities | 2 | 3 | 3 | 4 | 3? |
| Value for money | 2 | 3 | 3 | 3 | 5? |
| Price (inc VAT/p&p) | £19.55 | £21.50 | £15 | £19.95 | £1.50 |

**KEY: 1** = poor, **2** = bearable, **3** = good, **4** = very good, **5** = exceptionally good, **P** = promised
**Now replaced by CP-ROM2 at £25*

# REVIEWS

## SOFTWARE/ROMS

### CP-ROM

*CP-ROM* contains a suite of sprogs to enable a single document to be spread over several files on one or more discs. There are two advantages to this facility: one is that your document can be almost any size, limited only by disc space rather than RAM space, and second, even for a document that fits into RAM, by splitting it into smaller sections you can preview it in 80 columns. The second advantage can be obtained for smaller documents by fitting a 'shadow' screen RAM board (such as the Aries B20) or adding a second 6502 processor. However, neither of these will give you much more total space for your document.

*CP-ROM* keeps a file called !FLIST on disc which contains a list of the files in use, including (if necessary) the drive number and directory for each file. !FLIST also keeps a note of the current file in the list so that when it restarts, *CP-ROM* loads the last file you were using. Switching between files while editing is easy (but not automatic). Printing, previewing and search and replace can be performed over the whole document at once. This is not as convenient as having a wordprocessor specifically designed to edit large documents but it is not bad as most large documents break down naturally into chapters anyway.

Basically *CP-ROM* works as promised. The only small problem occurred when printing several or all of the files. The current file was printed as the version on disc, not the possibly different version in RAM, although this RAM version was preserved throughout the operation. The sprogs are in ROM Filing System (RFS) format on an 8k EPROM which seems a bit tight now that 16k EPROMs have become so much cheaper.

In fact *CP-ROM* has just been replaced by *CP-ROM2*, offering 16k for £25, featuring multiple disc documents of unlimited length, 80-column preview regardless of file length, 10 pages of help information, improved previewing, printing and formatting facilities, and enhanced file list manipulation.

### Wordwise++

*Wordwise++* (aka String Extension ROM) contains a set of functions to extend the string handling in *Wordwise Plus* sprogs which are made available just as though they were in the *Wordwise Plus* ROM. *Wordwise++* works intimately with the *Wordwise Plus* ROM, intercepting the error vector, so you must have the correct version to match your *Wordwise Plus*.

The 24 functions offer substring (including LEFT$, RIGHT$ and MID$), padding, search and replace operations on strings (you *can* do these things in *Wordwise Plus* but they are slow). All in all they seem to be a well chosen set of enhancements to *Wordwise Plus*'s string handling facilities. As an example, the function LPAD$(B$,":",10) in sprog 1 below means 'pad out B$ on the left with colons to a total length of 10 characters', ie, B$ becomes ":::::HELLO". Sprog 2 does the same job using standard *Wordwise Plus* commands, while sprog 3 executes the empty loop to find more precise timing figures.

The timings (in milliseconds per loop) are: sprog 1 = 185ms; sprog 2 = 1045ms; sprog 3 = 73ms. Thus the LPAD$ loop took 112ms whereas the 'straight' *Wordwise Plus* version




**WordEase: well-programmed and flexible**

took 972ms, over eight times longer! You cannot expect an eight-fold improvement in all cases but this ROM should speed things up considerably as well as making 'sprogramming' easier.

*Wordwise++* also has four 'star' commands and six utilities in RFS format. The star commands offer function key definitions, single key file selection from disc (nice, especially the auto-boot option), alteration of default preview mode (why?) and printout of all *Wordwise Plus* variable values. Five of the RFS utilities are sprogs – in particular, there is a dissassembly labeller. I've wanted one for years and have never seen one anywhere else. The routines for label printing and mail-merge are rather minimal. The last RFS file is a short machine code routine to make a Brother HR1 printer produce exclamation marks.

I am told that copies of these RFS files, together with a few more utilities, are due to be put onto a disc which will be available soon at a nominal cost of £1.50 inc. This disc is no use without the *Wordwise++* ROM as the new string facilities are used. The sample I have been sent shows a similar range of utilities to the Watford and Beebug offerings except, of course, that the string extensions are used to give shorter, faster utility sprogs.

### Overall

I was pleased to find that the manuals for all of these packages were fairly clear and easy to use although the *CP-ROM* manual was wordy.

These utilities are the first examples I have met of RFS files and I am astounded at how slowly they load! Normal ROM utilities (*Wordwide Plus, Disc Doctor*, etc) are extremely fast but RFS files seem to use a separate ROM service call for each byte read. A hard disc over a network should be much faster than RFS files. *WordEase* is not constrained by lack of space and is easily amended; neither does it use up a valuable ROM slot in your Beeb.

On the other hand, with the ROM based packages you do not have to find your utility disc before starting or keep copies on each wordprocessing disc you have.

None of these '*Wordwise Plus* assistants' will work fully over a network. Both *Word-Aid* and *WordEase* select the discs for you with *DRIVE commands. However, it should be possible to amend *WordEase* to avoid this and to keep the main utilities in a library directory. I don't know what Beebug's attitude would be to this but I believe it is generally willing to consider network usage of its software. All three ROM-based packages reselect disc (with *DISK) after loading utilities from ROM. The main features of *Wordwise++* work completely within the ROMs, so a network should present no problems.

In summary, then, I cannot recommend *Word-Aid* as it is bettered in almost all respects by the others. Each of *CP-ROM* and *Wordwise++* attack their chosen area accurately and can be recommended if you feel the need for their particular facilities. *WordEase*, although rather pricey for a fairly straightforward set of utilities, should be a good buy, especially if you can adjust the routines to suit your own requirements.

*WordEase (disc)*
*Beebugsoft, £21.50 inc p&p & VAT*
*Word-Aid (ROM)*
*Watford Electronics, £16 + p&p (min. £1) + VAT=£19.55*
*Continuous Processing ROM2 (CP-ROM2)*
*Norwich Computer Services, £25 inc p&p & VAT*
*Wordwise++*
*Interface Electronics and Computing, ROM £19.95 inc p&p & VAT, disc £1.50 inc p&p & VAT*



The Concept Keyboard* has been developed specifically to help secondary teachers involve their students in interactive projects.

Designed for use with BBC B micros, the keyboard is touch-sensitive and user-friendly.

A variety of software programs accompanied by special overlays gives the teacher immediate access to practical and interesting projects. Four new programs have recently been added to our list:

**D.C. Meters**

A practical program which simulates a direct current electricity meter. The student can explore the intricacies of D.C. power systems through an overlay and various different screens.

**Heat the House**

Students are introduced to process control application by a cross-section house with several options. Through opening and closing radiator valves, introducing lagging or fitting double glazing a better understanding of heat flow is achieved.

**Gumshoe Logic**

This graphically illustrated puzzle program is designed to be both entertaining and educational. It will encourage logical thinking by means of mental detective work, introducing students to gangster-style characters and some interesting situations!

**Small Mammal Survey**

This interesting project relates to the habits of smaller mammals in their natural habitats. The student is able to set traps, mark the animals and release them in order to obtain information about population distribution, growth and habits.

Several weeks of intensive fieldwork would normally be required to undertake this type of study. The Concept Keyboard may also be programmed for special class projects of any type, involving students in the preparation of overlays and input of ideas.

If you'd like to know more about the Concept Keyboard and programs, fill in the coupon and send it to: AB European Marketing, Forest Farm Industrial Estate, Whitchurch, Cardiff CF4 7YS. Or telephone Cardiff (0222) 618336 today.

# INTERACTIVE PROJECTS FOR ACTIVE MINDS




Please send me more information about the Concept Keyboard. A.U.

Name ______________________ School/College ______________________

Address ______________________

Telephone Number ______________________

*Concept Keyboard is a trade mark of Star Microterminals Limited. Registration applied for.

# ACORN USER



Tracking satellites: see page 146

# GUIDE TO EDUCATION

# SCHOOL SOFTWARE LTD

**BETTER SPELLING (Age 9-14)**
An exciting new way to improve your spelling, this courseware package concentrates on all the key areas of English spelling. Real value for money with up to 16 menu options. Prepared by an English language author.

**BIOLOGY (Age 12-16) CSE/O Level**
This program gives key definitions and promotes interactive learning through the question and answer sessions. Contents: Life & Cells. Mammals & Plants. Photosynthesis and Enzymes. Respiration. Excretion. Transport. Sensitivity. Reproduction. Cycles and Micro-organisms.

**CHEMISTRY (Age 12-16) CSE/O Level**
A wide ranging basic course in chemistry. Ideal for first examinations. Contents: 1. Chemical Changes. 2. Oxygen/Hydrogen A. 3. Oxygen/Hydrogen B. 4. Atoms. 5. Carbon/Sulphur. 6. Oxidation/Reduction. 7. Acids/Bases. 8. Ion exchange/Water. *Disc only.*

**PHYSICAL GEOGRAPHY (Age 12-17)**
This course covers comprehensively the physical geography course. Topics: Rocks, Earth movements, Agents of Denudation. Rivers, Glaciation, Erosion, Natural Regions.

**MAPWORK: Britain & Ireland (All Ages)**
This is the best progam of its kind, utilising hi-res screens to give excellent maps of Britain and Ireland. The program involves identification of locations and physical features. *Disc only.*

**Cassettes £9.95**
**Discs £12.95 40T/80T**
**Mail ORDER: 48hr delivery**

*BBC B, B+, Master*

**AND ECONET (AT NO EXTRA COST)**

**Also catalogue for CBM & Amstrad**

**Meadowvale Estate, Raheen, Limerick, Ireland. Tel: 010/353/61 27994** AA150A

# TURN YOUR BBC COMPUTER INTO A REAL TIME IMAGE PROCESSOR WITH THE IMAGE III FRAME STORE




IMAGE III is a high resolution Frame Store which can capture and display pictures in real time from any 625/525 line video source. Once captured in the 512 × 512 frame memory, the computer can access the stored image for processing or manipulation. The store utilises 6 bit A/D and D/A converters to give up to 64 grey levels per pixel. A major feature of this store is that if a lower resolution picture is selected then the store can be partitioned to store multiple pictures, eg for 256 × 256 resolution, four pictures can be stored. This allows the computer to compare two or more pictures captured from the same or different video sources.

The IMAGE III Frame Store turns your BBC computer into a low cost image processing system and opens up a range of possibilities such as Robotic Vision, Medical Imaging, Factory Inspection, Microscopical Analysis etc. Alternatively the store can be used in applications where picture data is arriving slowly, eg weather satellite transmissions, ultrasonic imaging, enabling the user to have a steady display without the need for long persistence display services.

IMAGE III plugs directly into the 1MHz bus on the BBC micro and is supplied with a comprehensive software package which demonstrates the features of the store.

**Price: £1,990 plus VAT**

IMAGE III is also available for the IBM PC and Apple computers.
IMAGE processing software package £590 plus VAT.

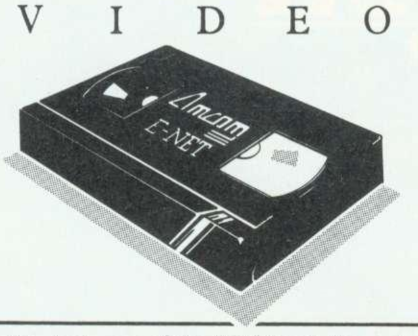
**ELTIME VISION SYSTEMS**
**Unit D29, Maldon Industrial Estate, Fullbridge**
**Maldon, Essex CM9 7LP**
**Tel: 0621 59500**

AA158

# CHOOSING A NETWORK?

# FREE

EDUCATIONAL
V I D E O



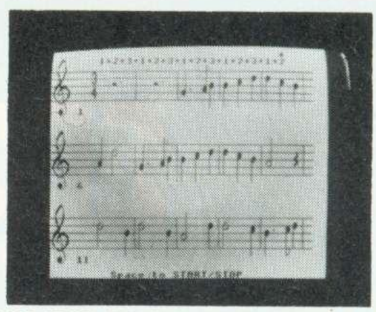

From the designers of the BBC hard disc network chosen by over 400 schools and colleges.

AMCOM E-NET

**The network designed with education in mind**

For your free video, simply send us your name on your school's or college's headed notepaper, stating the nature of your enquiry.

**Amcom Software Limited**
**35 Carters Lane**
**Kiln Farm**
**MILTON KEYNES MK11 3HL.**
**Tel: (0908) 569212**



**FACE THE MUSIC WITH MUPADOS**

- **MAKES PRACTICE A PLEASURE**
- **MAKES PERFORMANCES EXCITING**

The unique MUPADOS program scrolls the music scores on the screen (conventional notation, correct note groupings), plays the music simultaneously, and gives a continuous guide to the rhythm. You have complete control over the pace of learning. No programming is required. Our full professional studio accompaniment tape brings a new and rewarding dimension to musical performance in the classroom.
There is now a MUPADOS product for every instrument.
*"A must for musical schools" Primary Teaching & Micros, March '86.*
*"This package must be a winner" Acorn User, March '86.*
*"It's a dream" A & B, January '86.*

Send now for full details of the
MUPADOS RECORDER TUTOR and
the exciting new MICRO-MAESTRO range
- no stamp required:
MUPADOS LTD., FREEPOST, LAMPETER,
DYFED SA48 8ZZ (0570) 422877

Mupados

# EDUCATION

## NEWS

## Micro unit on the move

Micro-Robotics of Cambridge has developed a new micro controller.

This compact device may be programmed from a variety of computers and then left to operate independently. It has its own high-level resident language, designed specifically for control applications, which is simple to learn for anyone with previous Basic or Logo programming experience.

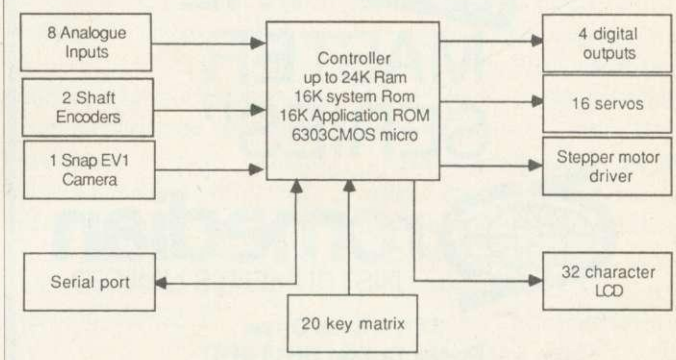
The unit runs independently of a power source since it carries batteries, which means that where portability and movement are important the unit has the flexibility to go where computers cannot.

Teachers have long bemoaned children's preconception that a computer is a box with a keyboard on it.

This unit will help to dispel that myth and its great versatility will be proven by the flood of applications it will generate.

Optional extensions to the controller include a 20 character detachable keyboard, 16 character two-line LCD display, a range of sensors, servos, buzzers, the Snap EV1 camera, stepper motor driver and many more.

It costs £195 and details are available from 264 Newmarket Road, Cambridge CB5 8JR. Tel: (0223) 32310.




**Micro-Robotics micro controller is suitable for use in a variety of situations**

## Teach-in on telephones

How do you teach a child how to respond to an emergency? What is the most effective method of training in the use of telephones?

Primary Programs think it has the answer with *Phonin*, its telephone skills package, developed in conjunction with MEP. The package comes complete with a British Telecom telephone (dial variety) and a connector to the analogue port. The software may be used with a Concept Keyboard.

A variety of tasks is undertaken including accurate dialling, dealing with emergencies, using directories and information services.

At all times the computer is used not only to monitor the child's accuracy but also to provide the motivating force behind the simulation. A payphone option is also available.

Details are available from Primary Programs, Claypits, Debden Road, Saffron Walden, Essex.

## Set your own speed with Slomo controller

The Slomo Micro Speed Controller from Nidd Valley Micro Products enables teachers to slow down and freeze programs. It operates by giving interrupts to the central processor and fits into the Tube interface on the underside of the machine – for people with second processors an adaptor links the two devices. A version is also available for the Electron.

Teachers will find this of great use in a variety of applications: where a pupil has special needs and is unable to cope with the frenetic speed required for some programs, this device will allow him or her to work at an even tempo. Moreover, when demonstrating using a computer to a class, a teacher often wants to pause and freeze the action.

### Mice

Also available from this company are two mice – the Anamouse and the Digimouse. The first is connected to the analogue port and is easily programmed using the usual ADVAL commands. The second is more conventional and will be compatible with both the AMX Mouse and Wigmore Megamouse software.

Details from Stepping Stones House, Thistle Hill, Knaresborough HG5 8JW. Tel: (0423) 864488.

**EDUCATION TOP FIVE**

| | Title | Publisher | Cassette | Disc | ROM | Electron | Shadow on B+ | 6502 | Econet |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Maths | Longman | — | £17.50-29.95 | * | — | — | — | — |
| 2 | Best 4 Language | Ask | £19.95 | £19.95 | — | Yes | Yes | — | — |
| 3 | French Mistress | Kosmos | £8.95 | £9.95 | — | Yes | Yes | — | — |
| 4 | Early Learning | BBC Soft | £10 | — | — | — | Yes | — | — |
| 5 | German Master | Kosmos | £8.95 | £9.95 | — | £8.95 | Yes | — | — |

Compiled by Gallup/Microscope. *Contact publishers: BBC Soft, 35 Marylebone High Street, London W1M 4AA. Tel: 01-580 5577. Kosmos Software, 1 Pilgrims Close, Harlington, Dunstable, Beds. Tel: (05255) 3942. ASK, London House, 68 Upper Richmond Road, London SW15. Tel: 01-874 6046. Longman, Burnt Mill, Harlow CM20 2JE. Tel: (0279) 26721.

**Commentary by Nick Evans**

# HIGH TECH-HIGH RISK!

Housings, Fittings, Locks and Alarms.

NOW "THE MASTER SERIES"

**remedian**
INSTRUMENTS LIMITED

**3 Overlinks Drive,**
**Poole, Dorset BH14 9QU**
**Tel. (0202) 708404. Telex 418297**

# Parents and Teachers Look what they are saying about STORM software -

"...an excellent addition to any school's software selection." — Acorn User

"There can be no doubt that the strength of this package lies in its simplicity." — Acorn User

"This program certainly makes a first rate attempt to simulate a real-life event." — Educational Computing

"Tremendous flexibility... the options offered mean that it can be used effectively with a wide abilities range." — A & B Computing

"Excellent value, financially and educationally." — Personal Computing Today




NEW

Send today for our FREE full-colour brochure (includes screen shots) AU2

To **storm** Software Newbury Court, Gillingham, Dorset, England Telephone (07476) 2774

Name

Address

Post Code

# RESOURCE FACILITIES

Masters' Lane
HALIFAX HX2 7DX
Telephone (0422) 65935

***Computer Specialists for Professionals***

**Hardware, Firmware, Software, Media, Expertise, Service**

**SOFTWARE:** Most Educational & Commercial Software available.
Inhouse software for the BBC microcomputer:
**ADVANCED PRINTER-DRIVERS** for **VIEW** (Epson, Canon, Kaga, Shinwa, Brother, Quendata, Daisystep, Juki 6100).
View file sample documentation.
**DFS DISKIT UTILITY** (Stat, Ezicopy, Rename)
**ORDER** (8 sorting algorithms demonstrated, with graphed timing comparison)
**ADVANCED SIDEWAYS RAM MENU (MASTER 128 & B+128)**
**COMPUTATION MASTER I & II** (prints worksheets for Primary Arithmetic)

---

**COMPUTERS:** Acorn, Amstrad, Apricot, Atari, Commodore, IBM, Olivetti.
**PRINTERS:** Brother, Canon, Citizen, Epson, Juki, Kaga, Quendata, Shinwa.
**DISC DRIVES:** Mitsubishi, Shugart, Teac (10-120 Megabytes for the Master).
**MONITORS:** Digivision, Microvitec, Mitsubishi, Philips (up to 100cm screens)

---

Extensive stocks of Discs including Dysan, Maxell, Memorex, 3M.
Comprehensive range of Accessories & Media.

---

**Sample Prices:** PRINTER-DRIVER, DISKIT, ORDER, ASRM £6.95 each inc postage & VAT.
SHINWA CPA80+NLQ £159. QUENDATA Daisywheel £179. Canon PW1080 £189.
Please add £10 carriage on hardware items, VAT at 15%.

---

**Official Education orders accepted.**
**Education prices available to staff if on headed paper accompanied by cheque with order**

SPEAK to SPINK for ADVICE and PRICE

***0422 65935***

AA154

NEWS

## Highlight in the spotlight

Highlight Software is the featured company in our small software houses section this month. It produces a wide range of primary materials which are programmed to a very high standard – in terms of maths, road skills and reading and language development these deceptively simple programs are some of the best I've seen.

Most are aimed at the seven to 11 age range. The principle is that the ideas should be presented in a stimulating and visually attractive way. For this reason nearly all the programs are 'arcade' in style.




**Entertaining English: good 'taster'**

Also, the programs have more than one level of difficulty, designed to allow children to develop their skills in a practical fashion. For example, in the *Adventurous English* package which deals with positional adverbs, the simple exercise used in the first part of the program is turned into an adventure game-cum-logic puzzle in the second. The *Read Right Away* series takes novel approaches to vocabulary and spelling and reinforces principles behind these skills without the child even noticing! I recommend *Read Right Away Pack 4* or *Entertaining English* as a taster.

Details from 36 Sherbourne Close, Barry, South Glamorgan CF6 5AQ. Tel: (0446) 745482.

# Wordprocessing made easy

Three primary wordprocessing packages have just been launched which each copes with the problems of introducing children to the basic concepts of editing and text handling in a totally different way.

*WordPlay* from BBC Soft uses animation to make the available facilities attractive to users. For example, when right-justifying the text Eve the Elephant marches up from her place at the bottom of the screen and tugs the padded text into position. Other characters left-justify, control deleting, move and copy text, push lines up and down or implement the filing utilities. The whole package comes complete with a spelling checker and dictionary editor. *WordPlay* is available for BBC B and Electron on cassette, transferable to disc.

Probably the most sophisticated package of the three is *Pendown* from Logotron, which uses both chip and disc to give a wide variety of facilities.

*Pendown* incorporates not only a spelling checker and dictionary but also a 'tree'-based planner enabling the child to consider the title of the piece being written, the separate paragraph headings, elements within those paragraphs, sub-elements of those elements and so on to a depth of 10 levels. The whole plan may then be transferred into the wordprocessor with indentations marking the level being worked at.

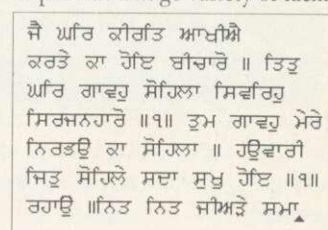
### On-line help

While the child is engaged in text creation there is on-line help with both vocabulary and spelling from the dictionary and its accompanying thesaurus facility.

Delete is effective in two modes – auto-repeat or single character. In single character mode the character above the cursor is deleted.

Print out of the final product is always important. The *Pendown* package allows a variety of fonts to be defined and comes complete with a Jumbo font which produces double-height, double-width characters.

Another wordprocessor has developed that facility further. *Folio* from Tedimen Software is a beautifully presented package which allows three different sizes of text to be printed. There is no attempt to provide a huge variety of facilities – instead it's an extremely friendly introduction for even the youngest child. In common with *Pendown*, this package may be connected to the Concept Keyboard. There is clear indication of where one line merges into another, thus providing a visual clue to the continuity of text across page lines. File handling is simplicity itself and the whole package is designed to avoid the simple errors that little fingers can make.




**Tedimen's Punjabi wordprocessor**

Tedimen also produces foreign language word-processors and has Indian dialect packages which cover Hindi, Gujerati and Punjabi – Urdu and Arabic scripts will follow shortly.

Contact Tedimen Software, PO Box 23, Southampton SO9 7BD. Tel: (0703) 473774. Logotron, 59 Markham Street, London SW3 4ND. Tel: 01-352 1088. BBC Soft, 35 Marylebone High Street, London W1M 4AA. Tel: 01-580 5577.

# Database to order

The entire database of educational software compiled by Nick Evans and featured in part on pages 159 to 170 is available from *Acorn User* in a variety of formats at £5.75. The datafile contains over 1700 records and is available for the *ViewStore* database. It may also be obtained as a text file for the *View* wordprocessor which can be converted into a datafile for a number of other database packages with a utility for 'grabbing' records.

The disc comes complete with the address list of publishers and instructions as to the most appropriate methods for searching the package with *ViewStore*.

Please send me........... Educational Software Database discs at £5.75 each.

I enclose a cheque/postal order made payable to Nick Evans for.................

Please tick format required:

| Disc track/side | 40/single | 40/double | 80/single | 80/double |
|---|---|---|---|---|
| View text files | ☐ | ☐ | ☐ | ☐ |
| ViewStore datafile | ☐ | ☐ | ☐ | ☐ |
| ViewStore and indexes* | N/A | ☐ | ☐ | ☐ |

* *Number of indexes available depends on space on disc*

Name ..........................................................

Address ..........................................................

.......................................... Postcode ..........................

Telephone ..........................................................

Send to Nick Evans, *Acorn User*, Redwood Publishing, 141-143 Drury Lane, London WC2B 5TF. Allow 21 days for delivery

# FIRST TRACK YOUR SATELLITE...

**Do you want to keep your eye on the 'eyes-in-the-sky'? Then why not use your micro to keep track of them?**

*Craig Underwood and Eric Twose*

A few keen amateurs have been involved in the tracking and receiving of data transmitted from satellites for many years, notably using the TIROS series of meteorological satellites. Recently the field has expanded to include satellites involved in scientific experiments and radio-amateur work which can be categorised as: polar orbiting weather satellites – the NOAA and the METEOR series; geostationary weather satellites – METEOSAT; scientific/radio-amateur satellites – the UoSAT series; and radio-amateur satellites – OSCAR and the RS series.

Each category has its own merits. For example, the NOAA, UoSAT and OSCAR spacecraft have the advantage of being fairly inexpensive to track in terms of ground-station facilities; however, they are only within range of the UK for relatively short periods each day. The geostationary METEOSAT is more expensive to receive because of its ultra high frequency (1.6945GHz) radio transmissions, but it has the advantages of producing very high quality pictures and of being available all the time.

## Getting started

You don't need to be a technical wizard or have masses of expensive equipment to get started. All that is required for a basic satellite tracking-station is a radio-receiver tuned to one of the satellites, a suitable aerial (possibly home made), a tape recorder to record any transmissions received and a micro.

The particular equipment you use will partly depend upon the satellite you wish to track. We cannot go into great detail here, but have provided a list of some suitable equipment and further reading at the end of this article.

To save listening to 'white noise' for hours, you'll need some way of predicting when a satellite is within radio-range, and although this can be done manually, the micro will give you a fast and accurate fix on the satellite's position as well as providing a means of decoding and displaying received data.

Apart from the special case of a satellite in a geostationary (geosynchronous) orbit, all satellites appear to 'rise', move across the sky and 'set'. Thus they will not always be in the sky or within your radio-range.

If a satellite orbits the Earth at a height of approximately 36,000km its orbital period equals 24 hours. If such a satellite is in orbit over the equator, it always appears to hang over a fixed point on the Earth's surface. This is very useful for communications satellites and some weather satellites as they can give continual radio or photographic coverage of almost a third of the Earth's surface.

To receive signals from a geostationary satellite, such as METEOSAT, all you do is point the aerial at the part of the sky where the satellite appears to hang.

Another important class of orbits is the polar one (as used by UoSAT, NOAA and most Earth imaging satellites such as LANDSAT). Here, the satellite is launched so its orbital path takes it close to the poles on every orbit; hence the name. The advantage of this is that as the Earth rotates under the satellite, virtually the whole surface of the Earth comes into view. This is particularly useful for Earth-imaging satellites which can thus photograph the entire globe. These polar-orbiting satellites will pass within range of a ground-station in the UK four to six times per day. These passes occur in two groups, separated by approximately 12 hours. In one group of passes, the satellite will appear to be 'ascending', ie, travelling from the equator, towards the north. In the second group, (half an Earth revolution later) the satellite will appear to be 'descending', ie, travelling from the north towards the equator. These times can be found by using tables, published by AMSAT-UK (see the references panel at the end of this article, page 151).

AMSAT-UK's 'OSCAR-locator' uses the information within these tables and provides a low-cost method of predicting the orbit of a satellite. The OSCAR-locator is a circular cardboard map representing a view of the Earth from above the north pole.

A movable 'D-shape' represents the generalised path of a polar-orbiting spacecraft over the northern hemisphere. This is free to move about the centre of the map, so it can be set up as indicated by the data in the tables to predict whether the satellite will come into range of the UK on that orbit and, if it does, at what time.



**Antenna control station: BBC micro and control box**

## Complex orbits

The OSCAR-locator is just one method of keeping track of satellites. For more complex orbits, like that of OSCAR-10 (which is a very eccentric ellipse), there are some excellent computer programs available. AMSAT-UK can advise on suitable software.

Getting a computer to perform the same task as the OSCAR-locator is fairly straightforward, but a full blown orbital prediction package requires a lot of 3D co-ordinate geometry and a knowledge of the effects of atmospheric drag.

Tracking any of these satellites will require



Eric Twose manually pointing high gain yagi antenna while a student reads off the orbital prediction

some form of antenna but a 'long-length-of-wire' will only give a good signal with the Soviet RS (Radio Sputnik) satellites, which transmit on the comparatively 'low' radio-frequencies of 29-30MHz. All the other spacecraft mentioned transmit at much higher frequencies and other kinds of antenna are more effective. Each category of satellite requires its own antenna, whose shape and dimensions are determined by the frequency and polarity of the radio signals transmitted. Signals from the UoSAT-1, UoSAT-2 and OSCAR-10 spacecraft can be received using an antenna designed for 144-146MHz operation (the 2m band), while the NOAA series need one that works in the 136-138MHz band.

Unfortunately, METEOSAT transmits on a very different frequency – 1694.5MHz – for which it is difficult to make a conventional antenna with sufficient gain, so METEOSAT is usually received via a dish antenna. Such systems are available commercially and often have a 'down-converter' so they can be plugged into a NOAA-type, 137MHz receiver. However, these systems tend to be expensive.

The simple dipole is a basic radio-wave detector. In practice, the dipole is made out of two quarter-wave lengths of tubular aluminium mounted end-to-end with a slight physical separation and insulated from one another by the plastic mounting. The external screening braid of the co-ax(ial) antenna downlead is connected to the end of one element, while the inner signal core is connected to the other.

You could easily make such an antenna yourself. Or perhaps someone has an old VHF antenna tucked away which can be dismantled and cut to suitable dimensions.

## Increasing the gain

The dipole has a low gain which means that only strong signals are detected, but it has the advantage of being omni-directional so it may be permanently mounted. To increase the gain, more 'parasitic' elements can be added. Unlike the active dipole, these are made from single lengths of narrower gauge aluminium and do not need insulating from the tubular aluminium antenna boom. The more elements, the higher the gain and the more directional the antenna, so high-gain antennae need to be steered so they actually point at the satellite as it passes.

In many ways, at VHF and UHF, the helix is an ideal aerial for satellite tracking as it's circularly polarised and easy to build (a plastic drain-pipe, some dowelling and a length of wire is all that's needed – it works very well!). The more turns, the more directional and the higher the gain; the fewer the turns, the less gain, but the less accurate you have to be in pointing the antenna. For example, with about two turns, the antenna can be permanently mounted pointing up and it will then pick up most passes.

Another bonus of the helical design is that an antenna tuned into UoSAT will also work well with NOAA, provided you can easily rewind the helix the other way. This is because the radio signals transmitted by both spacecraft come down a bit like a corkscrew and whereas NOAA is a right-handed 'screw', UoSAT is left-handed.

Dish antennae are only of use with the UHF transmissions of the geostationary METEOSAT. You could make a one- or two-metre dish from glass fibre and chicken wire/kitchen foil.

You can pick-up UoSATs 1 and 2 using a hand-held 144-146MHz narrow band FM 'walkie talkie' receiver (costing under £50) and by having a simple whip antenna.

Such a receiver allows you to listen to the 'Dalek-like' digitalker on board the UoSATs. This is a computer-synthesised voice which 'speaks' a series of numbers representing the status of the systems on board the spacecraft. However, if you are interested in actually recording the digitalker's spoken telemetry or

# PROBABLY THE ONLY DEVELOPMENT SYSTEM YOU'LL EVER NEED . . .




. . . runs FLEX, a powerful, well supported operating system; and gives access to a vast range of high level languages, Compilers and Cross Assemblers including: Z8, 8048, TMS7000, TMS320, 6800, 6802, 6808, 6801, 6803, 6301, 6805, 6502, 8085, 8080, Z80, 68000.

Its attractive modular design allows for easy expansion as your demands increase.

The complete system comprises:

- a 6809 Industrial Controller with 64K DRAM, battery backup, and Real Time Calendar Clock.
- the new CMS Floppy Disc Controller, supporting up to three Quad Density 3.5* or 5.25 Disc Drives. * two fitted as standard
- the recently introduced 40/80 Column Teletext Card with Centronics Printer Port and Serial Communications to an IBM style keyboard. All housed in an extremely rugged Industrial rack.

***This has to be the Best Value For Money on the MDS market today!***

**CMS Cambridge Microprocessor Systems Limited**

44a Hobson Street, Cambridge CB1 1NL. ☎ 0223-324141

---

**CROSSWARE**

SOFTWARE DEVELOPMENT TOOLS FOR THE BBC MICROCOMPUTER

## CROSS · ASSEMBLERS

FULLY SUPPORTED QUALITY SOFTWARE

### As exhibited at MDS '86

Is it really possible to use the BBC micro and a single disc drive to assemble more than 4 megabytes of source code?

Yes... if you're using one of our XR-series cross-assemblers and making full use of local labels.

But there is more to our software than that. So much more in fact that we will send you a free comprehensive data sheet to tell you about it.

Since 1984, industry has been using our cross- assemblers to develop applications ranging from defence systems to software for the Amstrad; and education has found them an ideal aid for teaching microprocessor system development.

They are available immediately from stock and are supplied on 16k ROMs, each with one or more utilities discs. They're Econet compatible and run on any model B or B+ fitted with Basic II and a 1.20 or later operating system.

| Order Code | Target Processors | Price |
|---|---|---|
| 6801XR | 6800,6801,6802,6301...6301X | £48.00 |
| 6805XR | 6805,146805,6305 | £48.00 |
| 6809XR | 6809 family | £48.00 |
| 8085XR | 8085,8080A | £48.00 |
| Z80XR | Z80, HD64180 | £48.00 |
| 68000XR | 68000,68008 | £56.00 |
| 65C02XR | 65C02, 65SC02, 6502 | £38.00 |

(prices exclude VAT)

*Further information from:*
**CROSSWARE PRODUCTS**
2 The Lawns, Melbourn, Royston, Herts SG8 6BA
Telephone: 0763 61539

---

## Take a close look at
# Klick
## Superframe




The Klick range of school furniture has an application in all areas of the school from computers and AVA's to storage equipment and OHP's. Please contact us for our current product catalogue.

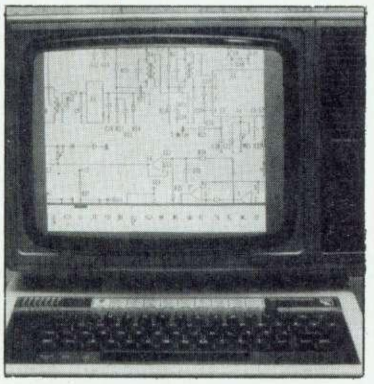
**Store Stock Systems Ltd,** Claverton Road, off Floats Road, Wythenshawe, Manchester M23 9NE. Tel: 061-998 9726.

# PINEAPPLE SOFTWARE

**Programs for the BBC model 'B' with disc drive with FREE updating service on all software**

## ARE YOU GETTING THE MOST FROM YOUR DOT MATRIX PRINTER AND DISC DRIVE?

**DIAGRAM is a new program which really exploits the full potential of the BBC micro and will enable you to obtain printouts of a size and quality previously unobtainable from your system.**



Originally designed for producing large circuit diagrams, DIAGRAM has now been improved to the point where it is invaluable for anyone who wishes to produce large areas of mixed graphics and text, and has many of the features normally found only in very expensive text/graphics processors.

DIAGRAM utilises a unique method of storing information on disc which allows not only very large diagrams to be created, but also allows rapid 'scrolling' of the screen both horizontally and vertically over the full area of the diagram.

The hard copy printout options available with DIAGRAM are second to none, and use is again made of the unique disc storage techniques to produce both horizontal and vertical printouts in various sizes down to probably the smallest high definition printing you have ever seen from your printer - a full 3*6 (18 mode 0 screen) diagram printed in a single print run onto an A4 sheet!

### FEATURES

- Diagrams may consist of up to 39 mode 0 screens, defined in any aspect ratio, e.g. 3 screens across by 13 screens down, 10 screens * 3 screens etc.
- Up to 128 Icons may be used by any one diagram, and may be predefined in full mode 0 definition with a maximum size of 32 x 24 pixels. An unlimited size library of Icons may be built up allowing rapid transfer of Icons from the library to a new diagram.
- Editing of diagrams can be achieved at any time during 'scrolling' around the screen, and edit features include:- Comprehensive horizontal and vertical line drawing routines with automatic 'perfect joins' at corners and T junctions. Entry of text characters and Icons at any time by a single key press. Also, any size rectangular area of the screen may be predefined, and this area may then be deleted, moved anywhere on the screen, or copied to a different point on the screen.
- Other features include selectable display colours, TAB settings, index names, and many more.
- Diagram is compatible with most dot matrix printers (specify type when ordering), and printouts can be obtained of any specified section of the diagram, in varying sizes and in either horizontal or vertical print mode. With an FX80 type printer up to three screens may be printed across the width of the carriage, and there is no limitation (apart from the diagram size) to the number of screens that can be printed in the vertical direction - up to six mode 0 screens will fit vertically on an A4 sheet.
- The latest version of DIAGRAM is now fully compatible with Marconi Tracker Ball, which allows 'scrolling' of the screen and many of the editing features to be carried out using the tracker ball.
- DIAGRAM is supplied in an attractive hard backed disc wallet with keystrip and comprehensive instruction manual.

**DIAGRAM SOFTWARE**
**£25**
PLUS VAT P&P FREE
Supplied only on disc. Please specify printer type and 40/80T disc when ordering.

**MARCONI TRACKER BALL**
**£60**
PLUS VAT P&P £1.75
Includes Icon Artmaster Software.

**MARCONI TRACKER BALL AND ICON ARTMASTER PLUS DIAGRAM SOFTWARE**
**£76.50**
PLUS VAT P&P £1.75

**All orders sent by return of post**

Many of our customers have said they think that DIAGRAM is worth twice the price, so order now before we put the price up!

**39 Brownlea Gardens, Seven Kings, Ilford, Essex IG3 9NL. Tel:01-599 1476.**

# At last – A system which you can tailor to your own needs

(makes other databases for the BBC micro look silly by comparison.)

MICRONET800 dec 85

**NEW**

**POWER**

5 files open at once, 8 subsets, 8000 cards per file, 255 fields per card, 200 characters per field. FULLY RELATIONAL e.g. copy customer/product details onto an invoice from different files.

**SPEED**

Search and access a card in typically 2 seconds. System Delta extensions giving machine code speed to BASIC applications.

**Card Index Application** **54.95**
*(Includes card index support, System Delta ROM)*

System Delta Advanced Reference Guide **19.95**
*(Includes System Delta support)*

**SYSTEM DELTA**

For the first time, data handling programs can easily be written using simple commands. Now your application can be tailored to look as you wish, and do what you want, without any knowledge of how the data is stored. System Delta also contains screen presentation, menu selection etc. e.g. one command to scroll around card.

Supplied with CARD INDEX APPLICATION for non-programmers, which uses most System Delta facilities. Other System Delta applications available early 1986 include Stock Management, Accounts and Estate Agents etc.

M·I·N·E·R·V·A

MINERVA SYSTEMS, 69 SIDWELL STREET EXETER DEVON EX4 6PH TELEPHONE 0392 37756

the two satellites' digital tone-encoded telemetry, you should check that the receiver has an audio output/headphone/extension speaker socket, so you can take an output to a cassette recorder or portable reel-to-reel machine.

A simple receiver-antenna system such as this will get you started and will be sufficiently sensitive to allow you to collect data. Some days during the week one pass will be close enough to allow reception of a good deal of data on that pass and some data on the earlier and later pass; on other days, two passes will fall either side of your tracking station, so you'll be able to get a fair amount of data from these two passes.

However, if you want to pick-up more data, more reliably, you'd be advised to get a better receiver. Around £60 will buy you a 2m narrow band FM receiver that looks like the sort of CB rig mounted under the dashboard of cars. The only thing about these receivers is that they'll only allow you to pick up UoSATs 1 and 2.

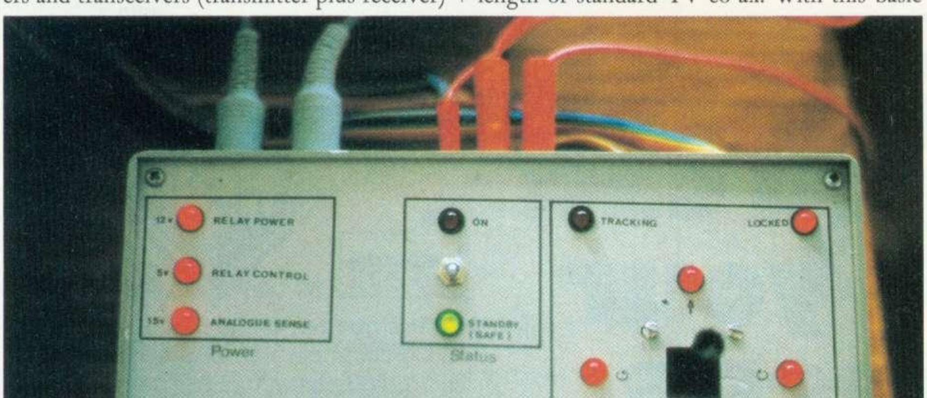
The NOAA series transmit at VHF on the 136MHz band – see 'Downloading the Weather', *Acorn User* August 1984, for more details.

If you are prepared to pay a price of between, say, £150 and £700, there are receivers and transceivers (transmitter plus receiver) on the market which will allow you to cover most of the current satellites.

A number of manufacturers are now producing 'complete systems', ie, aerials, receivers and decoders, for some of the satellites mentioned. These might well represent a good entry point into satellite tracking – as always, though, it pays to shop around.



**View of antennae: yagi left, NOAA right, and simple dipole**




**Antenna control box allows manual control via the joystick**

## A practical set-up

The Ground-Track Project was set up at Scarborough Sixth Form College and got involved with satellites in January 1984, when we received a booklet from the University of Surrey about UoSAT-1. To start with, we bought a receiver for about £50 and made up a crossed-dipole aerial out of wood and welding-rods, which was connected to the receiver by a length of standard TV co-ax. With this basic system, UoSAT-1's telemetry and digitalker was picked-up for the first time on February 29 1984. A quick program was then written to produce experimental results from the numbers which were keyed into a BBC micro while listening to digitalker.

It was quickly realised that the path of the satellite had to be predictable, as up until that time, the receiver had to be left on all the time, as we had no idea when the satellite was within range. It was also found that getting results from digitalker wasn't very satisfactory, as it took a few minutes for the telemetry to be 'spoken'. During this time, there were many bursts of noise which made it difficult to understand the electronic speech.

On the other hand, the digital telemetry was transmitted continuously, each 'frame' of data lasting five seconds. This would provide far more data per pass, and be more error-resilient, but it needed some additional hardware before the signals could be decoded. Thus, shortly after picking up the first few signals, we began to write an orbital prediction and a telemetry data handling package. These were to become *Sat-Pack*.

## Perfect reception

Meanwhile, UoSAT-2 was launched and as its signals were directly compatible with the BBC micro, we concentrated on this spacecraft. We were also lucky enough to be loaned a cross-polarised yagi aerial by the Physics Department of the University of York. Although bulky, this enabled us to pick up the satellite's signals close to the horizon and achieve pass times in excess of 15 minutes with mostly perfect reception of data.

It soon became clear that if we were going to stick with a high gain antenna, some form of remotely-controlled system was required to track the spacecraft. To this end, an ex-outside broadcast camera mount was bought for £45.

After about a year's project work, we've managed to get this system under the complete, real-time control of a pair of BBC micros. One runs the *Sat-Pack* orbital prediction package which outputs tracking data via the RS423 port, while the other runs our control program, taking this data in and tracking the aerial automatically.

Recently, work has restarted on UoSAT-1. We are testing the prototype of a system called Astrid (produced by MM Microwave Ltd), which consists of a simple dipole aerial, connected to a receiver/decoder which has the ability to control a cassette recorder. The on-board decoder produces TTL signals from both UoSATs and plugs into any RS232-compatible port. On our system, it is linked to the RS423 port on the BBC micro, which is running the *Sat-Pack* telemetry handling/graphing packages.

We are also beginning to investigate the use of satellite weather pictures received from NOAA. We have a Cirkit weather receiver (about £50) connected to a turnstile aerial (from Halbar).

This is mounted on the roof, pointing up. It is found that the signals are only strong for a couple of minutes on a good pass, so we really need a pre-amp, or a steerable, high-gain aerial. The pictures are recorded on the BBC micro via the Unilab interface.

The *Sat-Pack* package currently comprises three discs. *Orbital Prediction* is a very powerful suite of programs designed to locate the position of any satellite (including those of high orbital eccentricity) and to plot its ground-track so the user knows exactly when a satellite is within range of their receiver. Information can be displayed in a variety of forms including tabular 'Whole Earth' Mercator Projection, Northern Hemisphere Polar Projection and European Theatre Projection. Data is also sent to the RS423 serial port or disc file to allow control of a tracking aerial.

*UoSAT-2 Telemetry* is a suite of sophisticated data handling programs, specifically written to decode the telemetry transmitted by the University of Surrey's satellite, UoSAT-2. This data can be picked up as a 1200 baud Audio Frequency Shift Keying (AFSK) signal, very similar to the signals which encode BBC micro programs onto cassette tape. By feeding these signals into the cassette or RS423 port of the Beeb from a tape recording or in real-time, they can be translated into numerical data which are analysed for errors and stored on floppy disc as a 'processed data file'. This can then be displayed in a variety of ways. The processed data file has a simple format so the user can write his or her own data handling routines to complement the package.



**Getting ready for pictures: students fit the yagi antenna on the camera mount**

*Graphics Disc* is a suite of programs allowing the user to graph the telemetry data generated by the second disc, and to look for data correlations.

*Sat-Pack* is already in use in many schools and colleges and is rapidly becoming the 'industry standard' among radio-amateurs. It's available through AMSAT-UK and directly benefits the Space Programme.

## Conclusion

We started satellite tracking for an initial cost of about £50. Our present system, excluding computers, is worth about £360. This includes an aerial and receiver for NOAA, a high gain aerial, rotator and receiver for UoSAT-1 and 2, Astrid for the UoSATs plus the complete *Sat-Pack* software (three discs). That is, for less than the cost of a BBC micro, we can track most of the satellites generally available, providing work in computing, electronics, control technology, physics and geography.

You don't have to be a technical wizard to get started and satellite tracking is not only educational but also great fun!

## REFERENCES

**Useful books**

*The Satellite Experimenter's Handbook,* Martin Davidoff, ARRL

*The Sheffield Project,* S J Spencer

*VHF/UHF Manual,* RSGB

*ARRL Radio Amateurs' Handbook,* ARRL

*Oscar News,* AMSAT-UK

Bi-monthly journal with Orbital Calendar. Free to members, but the calendar is available to non-members for a small fee.

All these publications are available from AMSAT-UK, which is a totally voluntary radio amateur's satellite organisation and user group.

Contact Ron Broadbent, G3AAJ, Hon Secretary, AMSAT-UK, 94 Herongate Road, Wanstead Park, London E12 5EQ. Please enclose an SAE.

**Aerial suppliers**

Halbar Ltd, Unit 1, Bury Walk, Bedford MK14 0DU. Tel: Chris Meadows on (0234) 44720.

UoSAT, NOAA turnstile aerials, etc, plus a complete weather satellite system.

Randam Electronics, 12 Conduit Road, Abingdon OX14 1DB. Tel: (0235) 23080.

Multi-element yagis, etc.

Jaybeam Ltd, Kettering Road North, Northampton NN3 1EZ. Tel: (0604) 46611.

Antennae and accessories.

**Receivers**

MM Microwave Ltd, Unit 1, Thornton Road Industrial Estate, Pickering, N Yorks YO18 7HZ. Tel: Steve Webb or Ken Maddock on (0751) 74713.

Can supply Astrid, a complete system for UoSAT.

Cirkit Distribution (formerly Ambit), Park Lane, Broxbourne, Herts EN10 7NQ. Tel: (0992) 444111.

Can supply receivers, pre-amps, converters, books, etc.

Timestep Electronics Ltd, Wickhambrook, Newmarket, Suffolk CB8 8QA. Tel: (0440) 820040.

Can supply a complete system for UoSAT or NOAA.

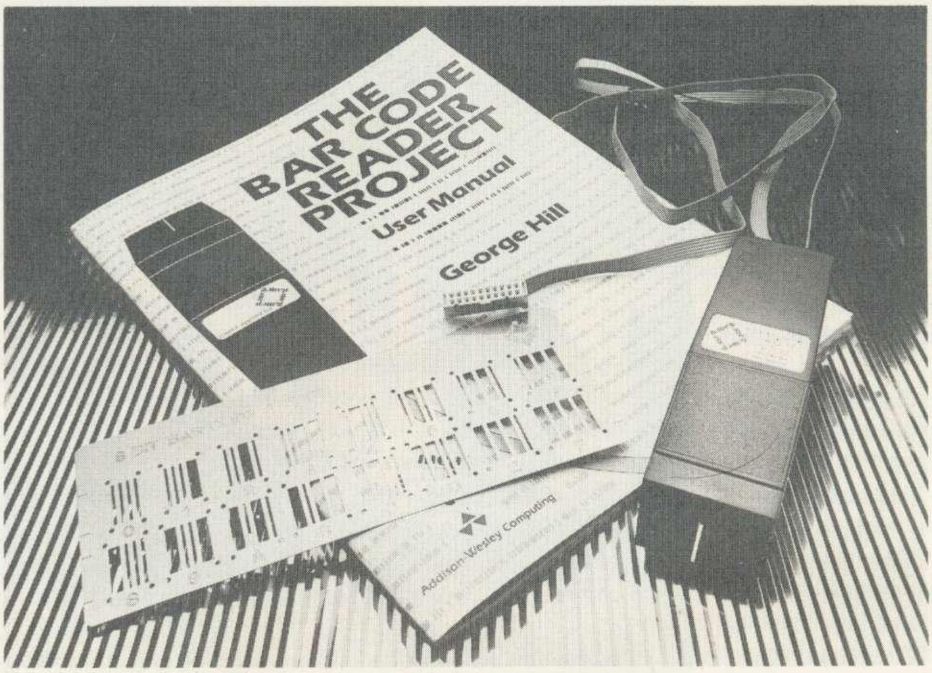
**Software and hardware**

*Sat-Pack* and other satellite software is available from AMSAT-UK, together with hardware decoders, PCBs, etc. Contact: 94 Herongate Road, Wanstead Park, London E12 5EQ. Please enclose an sae.

# BAR CODE

## ACORN USER OFFER

# Bar code readers and program booklets




Illustrated above are some of the contents of the Bar Code Teaching Pack, designed to give the student or home user the chance to learn about and use bar code technology.

The pack was developed by the Microelectronics Education Programme (MEP) and Addison-Wesley and is available direct to readers of *Acorn User*.

The pack includes:

- the bar code reader – which connects directly to your microcomputer
- a user manual written by George Hill
- software to print bar codes and a metal bar code stencil
- a 40-track disc or cassette of utility software – the cassette software can be transferred to 40 or 80 track disc.

The total pack costs £83.84 inc VAT and £2.95 postage (£72.90 exc VAT), and the **Department of Trade and Industry (DTI) has accepted the teaching pack is eligible for support in its entirety.**

### Bar code booklets

All the major listings for this issue, as printed on the yellow pages, are reproduced in bar code format in our booklet. Send a cheque or postal order for £1.90 plus an A4-sized sae to the address below.

Back issues of the booklets are available from December 1984 onwards, so you can catch up on any you missed.

Please state which month you require when ordering bar code booklets.

Please send me: ______ Bar Code Reader Teaching Packs* at £83.84 each inclusive

☐ 40 track disc ☐ or cassette (*Please tick appropriate box)

I enclose cheque/postal order for £ ______ made payable to Redwood Publishing

NAME

ADDRESS

POSTCODE

SIGNED DATE 152-5

Send this form with your remittance to:

**Bar Code Offer, Redwood Publishing, 141-143 Drury Lane, London WC2B 5TF** HA5

# VISION OF THE FUTURE

**We explore the subject of computer awareness and look at the need to teach children the facts of computer life**

*Chris Drage and Nick Evans*

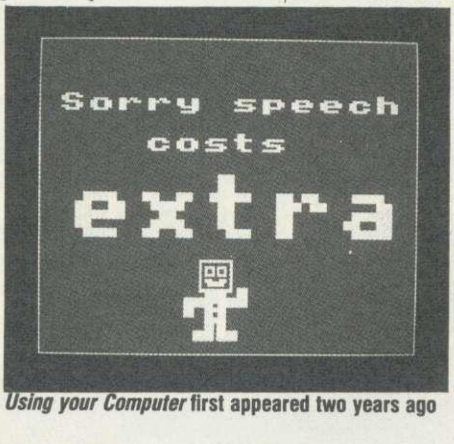
'Why "computer awareness"? What's so special about the computer that we need to be made aware of it?' These questions are often thrown at computer enthusiasts who try to persuade their colleagues, especially in school, to realise the role that the computer can play in their work. In rather stilted terms we can mention 'pen awareness' and 'chisel awareness' especially if we talk about them as tools for performing certain tasks. 'chalk awareness' and 'overhead projector awareness' are ones that should be within every teacher's experience. The computer as a tool, for children and adults, inside school and out, is becoming of vital importance. This is reflected in the growing numbers of packages designed for teaching children the facts of computer life and bringing their teachers' methods more up-to-date.

### Short-term problem

The problem with computer awareness is that it *should* be a short term problem. Even with the rise of the computer in every aspect of our lives many people are still unaware of its possibilities. They need training. Children too, especially in the upper parts of the junior and throughout the secondary school, do not have any depth of knowledge about the computer unless they have been trained. However, if you take the average eight or nine-year-old in the class of a 'computerate' teacher and ask them to use a program, awareness of the way things work, the setting up of the machine, the layout of the keyboard and a general familiarity and air of unconcern becomes immediately noticeable. This child is already 'computer-aware'. He or she will not need a computer awareness course as it is at the moment – computer studies, perhaps – the computer already is a normal part of everyday life.

Every time the school computer is used it builds on teacher's and pupil's awareness of the micro's capabilities and shortcomings. Both children and teachers need to understand what micros are, what they can do and how they do it. This is an area vital to the primary school, where, for a variety of reasons, many teachers are still very unaware of the power of the micro in aiding learning. Any way the technology can be de-mystified, made 'more friendly' and can be seen to further children's learning in the classroom must be welcome.

For very young children the concepts related to understanding the role of microcomputers are too complex. It's unnecessary to formalise their computer understanding beyond actually sitting them down and letting them interact with good software which relates to their everyday experiences. By the middle or top of the junior school, however, the situation is different. When presented in the right way, children do begin to understand the concepts involved, and it's at this level where two very successful resources come into their own: *Using your Computer* from BBCSoft/BBC School Radio and *The Micro at Work* from Granada TV/GSN. Adopting two differing approaches, both these packages are extremely valuable in the primary school.




***Using your Computer*** **first appeared two years ago**

*Using your Computer* first appeared two years ago when it was broadcast as *Introducing Science Extra*. Its Computer Synchronised Audio (CSA) approach is the brainchild of Arthur Vials and Fred Harris (of *Micro Live* fame). It's a technique which combines an audio voice-track with software to provide a unique audio-visual presentation (see Education News in the February '86 issue of *AU*). This approach is an instant success in the primary classroom.

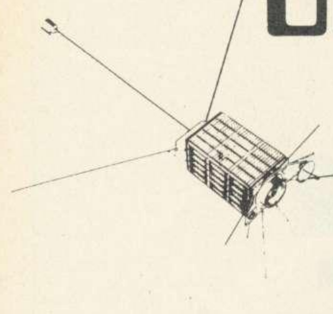


**'BBCSoft's approach is an instant success'**

BBCsoft now presents the broadcast and software tapes with a comprehensive manual which contains the scripts for each of the four topics, including In the Picture; Does it Think?; Basically Speaking; and Bags of Chips.

I decided that this package would be an excellent opportunity to help a computer-shy teacher and her 10-year-old pupils get to grips with the school's BBC micro. The teacher concerned worked through each of the CSA presentations herself before involving the children, which proved very valuable as she learnt

# DATA FROM SPACE!






ASTRID receives from UOSAT satellites:-
- ★ News Bulletins on spacecraft matters.
- ★ Operating schedule of UOSAT.
- ★ Satellite Status.
- ★ Experimental Data.
- ★ Messages on the Electronic Mailbox System
- ★ Orbit Information.
- ★ Digitalker Speech Telemetry.
- ★ CCD Television Camera Signals.

Don't just play games on your computer – use REAL DATA from SPACE!

UOSAT Satellites are designed and built by the University of Surrey to encourage a deeper understanding of the rapidly expanding industries of space technology, electronics and computing.

# ASTRID

**Automatic Satellite Telemetry Receiver & Information Decoder**

ASTRID is a COMPLETE Satellite receiving and decoding package that allows data from UOSAT Satellites to be displayed on home computers via a serial interface, (ASCII format 1 start 7 data 1 even parity & 2 stop bits). The system is fully tested and ready to operate and comprises: Receiver/Decoder/Power Supply Unit/Aerial/Feeder/Test Tape/Connecting Leads/ Instruction Manual.

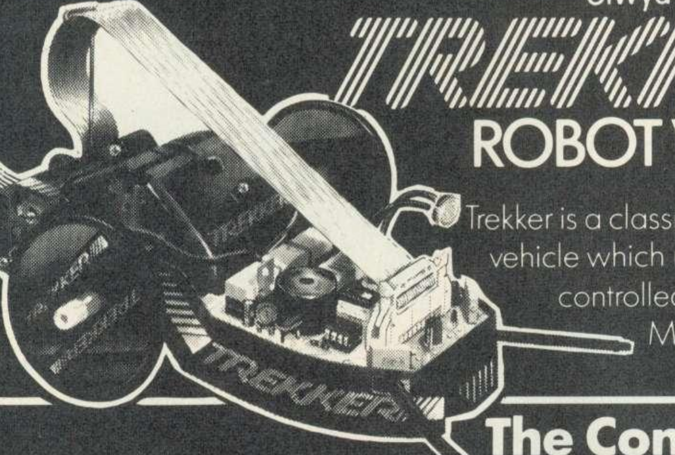
ASTRID operates FULLY AUTOMATICALLY – using the remote control on your tape recorder – for those night time passes!

ASTRID is only available from the manufacturers. Please send cheque or postal order (or use your Barclaycard or Access number) for £149 fully inclusive of VAT and P+P to MM Microwave Ltd., Kirkbymoorside, York YO6 6DW. Tel: 0751 31620.
Available, with display software, to plug straight into the BBC B and Spectrum 48K.
ASTRID system and other suitable computers, contact us as above.

AA60 Access VISA

Clwyd Technics

# TREKKER ROBOT VEHICLE




Trekker is a classroom robotic vehicle which may be entirely controlled by your BBC Micro-Computer.

**A MAJOR ADVANCE IN EDUCATIONAL ROBOTICS!**

**Export Enquiries Welcome**

## The Complete Educational Robotics Package for the BBC Micro-Computer

*COMPLETE PACK CONTAINS:*
- *TREKKER VEHICLE*
- *INSTANT START GUIDE*
- *SOFTWARE GUIDE*
- *30 PIECES OF SOFTWARE*
- *USER GUIDE*
- *ACTIVITY WORK SHEETS*
- *PROJECT WORK SUGGESTIONS*
- *OHP TRANSPARENCIES*
- *FUNCTION KEY OVERLAYS*
- *PEN PACK*
- *SPARES PACK*
- *UMBILICAL CORD*

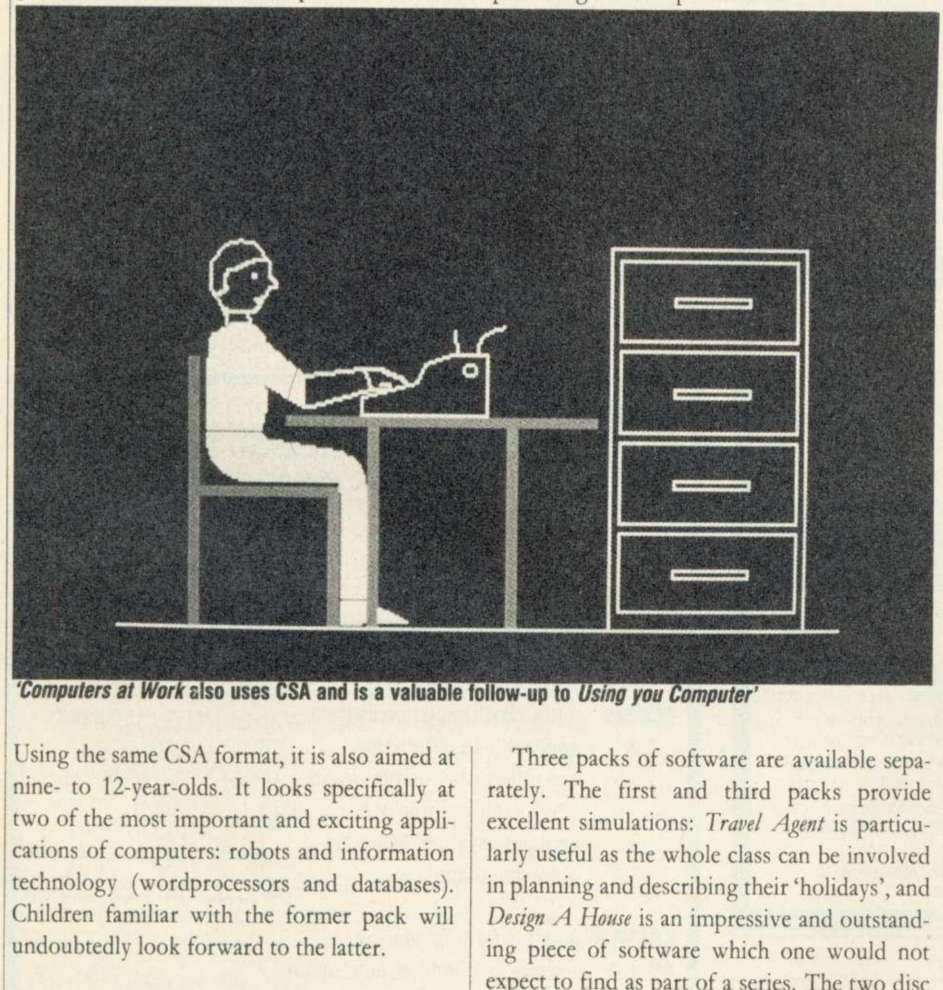
**ONLY £139.95 + VAT**

Clwyd Technics
TREKKER ROBOT VEHICLE

**CLWYD TECHNICS LIMITED DEPT AU5**
**ANTELOPE INDUSTRIAL ESTATE,**
**RHYDYMWYN, MOLD, CLWYD**
**TELEPHONE: (035283) 751**

'so much about computers' it gave her confidence to introduce the micro into her teaching. With the children in groups of four, she set up a cassette recorder with a junction box and four headphones attached, which enabled the group to work silently without distracting the rest of the class (I had previously turned off the Beeb's sound output by *FX210,1). When every group had completed the first presentation they began the next. It proved a very stimulating and rewarding experience for all concerned. My only criticisms of an otherwise excellent package are the desperate need for a tape-to-disc copier routine to handle transfer to disc storage, and a way of silencing the sound output from the computer.

*Computers at Work*, also by BBCSoft, will provide a valuable follow-up for this class.



**'*Computers at Work* also uses CSA and is a valuable follow-up to *Using you Computer*'**

Using the same CSA format, it is also aimed at nine- to 12-year-olds. It looks specifically at two of the most important and exciting applications of computers: robots and information technology (wordprocessors and databases). Children familiar with the former pack will undoubtedly look forward to the latter.

### How computers are used

Granada TV has put together a particularly exciting package of TV broadcasts and computer software called *The Micro at Work* which is aimed at the top end of the primary (lower secondary) school. A series of 10, 15-minute broadcasts serves as resource material for teachers wishing to introduce aspects of computer usage into the curriculum. Unlike the BBCSoft packages, the stress is on how computers are used, not how they work or are programmed. The broadcasts can be regarded as a 'visit' to a particular location where computers are at work. They illustrate how computers provide solutions to particular human problems, emphasising the interaction of humans with computers and the benefits of computerisation. Each programme illustrates how scaled-down versions of featured applications can be handled in the classroom. Although they will have been broadcast by now, a compilation video will be available from Granada – alternatively your local teacher's centre may have recorded the broadcasts.

As each topic is independent of the others, the broadcasts can be regarded as starting points from which a number of activities can evolve – the series booklet provides a wealth of suggestions for developing the topics and providing follow-up activities.

Three packs of software are available separately. The first and third packs provide excellent simulations: *Travel Agent* is particularly useful as the whole class can be involved in planning and describing their 'holidays', and *Design A House* is an impressive and outstanding piece of software which one would not expect to find as part of a series. The two disc pack comprises all the materials needed to design a house, plan and modify its furnishings and print out the designs, and, like *Travel Agent*, large numbers of children are catered for. Most of the children work away from the computer while each group tests its design – for added reality, each group has its own budget in which to work.

I found the second pack lacked the sophistication of the others, adopting an 'electronic blackboard' approach.

The flexibility of this series of programmes is excellent. With the exception of programme eight (the delivery of which I found rather weak), the broadcasts provide a real starting point from which all manner of activities can stem. There is considerable freedom to organise these activities in any way a teacher finds suitable, with or without the computer.

Both BBC and Granada TV provide more than adequate computer awareness materials for the children – but what about the teaching staff? Until all teachers understand the possibilities offered by computers to enhance children's experiences and are willing to have a go themselves, educational computing will only occur in patches throughout the school.

### Impressive titles

It is with the development of computer awareness through in-service training that Resource (Humberside and South Yorkshire MEP) has produced its *ISIS* pack. The *In-School-In-Service* package provides 11 items of software, a modified NESTEC buggy (with interface board), complementary teacher materials relating to each pack and a case study of computer use in industry with 15 accompanying slides. The software titles are impressive enough: some are 'vintage' pieces; others newly designed especially for the pack. Yet what makes the *ISIS* pack so special is that it comes complete with a delivery system to enable each school to create a structure in which the materials can be used across the curriculum – a system whereby the staff can communicate their computer experiences to their colleagues through school-based INSET courses. For teachers using the school computer for the first time there are considerable support materials to guide them through a series of lessons and help with learning is provided by school-based in-service courses.

There isn't space here to do the *ISIS* pack justice. Resource was voted the Educational Software House of 1985 by *Educational Computing* and the *ISIS* pack only confirms this choice. If you have teachers in your school who say: 'I don't understand computers' or 'I don't have the time to learn about it' or, 'I cannot entrust the children's learning experiences to a fallible machine', the *ISIS* pack will go a very long way in helping them undergo a change in attitude. It provides a crutch, a stimulus and a starting point in a large range of school computer applications.

Also from Resource comes the *IT in the Secondary School* pack which provides materials and case studies for introducing secondary school pupils to the ideas of how a computer is linked to a variety of real life applications.

This emphasis on the computer in business is taken up by many other packs, all vying for




# A NEW GENERATION OF MOUSE INPUT CONTROL

## ANAMOUSE

This is a new concept in positive mouse control for the serious user. Specially designed to give you superior movement precision.

Incorporation of mouse routines into your own programs is simplicity itself. Co-ordinates and key status can be read directly in Basic from the analogue port.

Three dimensional design can now be yours. ANAMOUSE features a Z axis control which is operated independently of mouse movement. X and Y co-ordinates are generated by a precision tracker ball and potentiometer system.

You can apply Z axis to many useful functions such as zooming, secondary cursors and icon movement. With Z axis as well as the three programmable keys, you will be able to greatly expand the capability of mouse control in your programs.

ANAMOUSE offers you the positional accuracy for CAD, graphic art and tracing applications normally associated with devices at many times the cost. And of course ANAMOUSE can be used as a standard pointing device.

A fully guaranteed, quality British product. Only **£34.95** including VAT.

## DIGIMOUSE

An exceptionally accurate digital input device which connects to the BBC user port. You can now experience truly positive mouse control. And at a sensible price.

Compatible with existing graphic art software packages, and particularly recommended for finer detail freehand drawing.

DIGIMOUSE, with three programmable keys, can easily be incorporated into your own software using the unprotected machine code routines supplied.

Excellent value at **£34.95** including VAT.

## SLOMO – PROGRAM SPEED CONTROLLER

This unique, hand-held peripheral allows you to control the running speed of any program to suit your own needs.

Very easy to use, SLOMO plugs directly by cable into the BBC's Tube socket. Gives you fully variable speed control from normal down to standstill. Plus instant freeze frame for those moments of distraction.

Highly acclaimed by the educational and medical therapy professions, SLOMO is used in many special needs centres and leading hospitals.

For serious programmers, this is a de-bugging aid you should not be without. Saves hours of frustration by highlighting errors at slow speed.

If you're a games enthusiast, you can use SLOMO to learn those fast-action complex games at your own pace. And use freeze frame to give you time to study the screen. Or just to take a break.

Compatible with 99% of software on BBC A and B and Master Series. UK Patented. Only **£14.95** including VAT and postage.

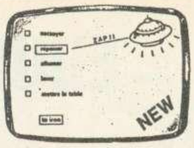
Please send for the BBC: (allow 14 days for delivery)

| QNTY | | PRICE EACH | TOTAL £ |
|---|---|---|---|
| | ANAMOUSE | £34.95 | |
| | DIGIMOUSE | £34.95 | |
| | SLOMO | £14.95 | |
| **TOTAL** (includes VAT & postage) | | | |

I enclose cheque/PO, OR debit my Access number:

Signature: ............................................
NAME: (please print clearly) ............................................
ADDRESS: ............................................
............................................ Post code: ..................

SEND TO: (no stamp needed) NIDD VALLEY MICRO PRODUCTS LTD. Dept AU/586, Freepost, Knaresborough, N.Yorkshire, HG5 8YZ
For instant Access orders or more information ring Harrogate (0423) 864488




## MEDSTAT LTD

MedStat Ltd. introduces new, exciting Teaching Programmes.
— Developed by experienced Teachers
— Motivating
— Educational
— Enjoyable
— Challenging
— Versatile
— For Classroom or Home

— **"SPORTDATA"** for monitoring of sports performance
— **"STATSKIT"** for Maths/Statistics
— **"PROJECTDATA"** for project work eg Biology, Geography
— **"GENECRACKER"** for Genetics

**FRENCH: GERMAN: SPANISH: ITALIAN**
Suitable for beginners, intermediate and advanced levels
— Vocabulary
— Regular Verbs
— Irregular Verbs
All programs available for the BBC micro

Send £12.95 for SPECIAL FRENCH VERBS EXAM OFFER. State 40/80 track. (BBC B)

IDEAL FOR EXAM REVISION

***WRITE OR PHONE FOR OUR FREE SOFTWARE CATALOGUE***
***PHONE/MAIL ORDER BY ACCESS OR CHEQUE***

**MedStat Ltd,**
**Dept. A, City House, Maid Marion Way,**
**Nottingham NG1 6BH. Tel: 0602 411120**
**Telex: 377844 ABCPLS G**
**Trade Enquiries welcome**

AA100

## ★★★ELECTRONIC MODELLING SOFTWARE FROM SEASIM★★★

MICROSPICE – this DC and AC circuit simulator allows detailed semiconductors' and other devices' behaviour, including noise, to be investigated on the Beeb. Device parameter values may be swept to give spread of DC operating points at which small-signal AC analyses may be performed. Any combination of AC and DC node voltages and source currents may be listed. Full editing, saving, etc. makes this powerful program valued by both R&D and advanced educational users alike.

**Disk (BBC Model B) and manual. Price £99 + P&P* + VAT (*£2 in UK)**

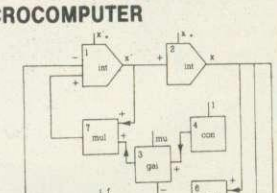
Other engineering software is available from Seasim.
Please contact us for further details.

**Seasim Controls Ltd, The Paddocks, Frith Lane, London NW7 1PS.**
**Tel 01-346 9271 Tlx 21189 SEASIM G**

AA101A

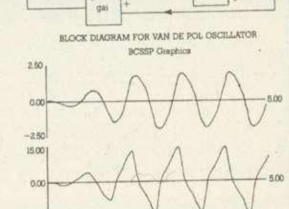
## INTERACTIVE DYNAMIC SIMULATION

**FOR THE BBC MICROCOMPUTER**



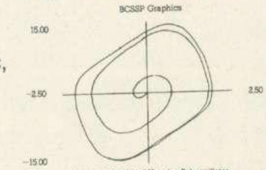

BLOCK DIAGRAM FOR VAN DE POL OSCILLATOR

BCSSP Graphics




Displacement and velocity for Van der Pol oscillator (mu = 4)

BCSSP Graphics




Phase plane plot of Van der Pol oscillator (mu = 4, x horizontal, x' vertical)

**BSETR:** Translates equations into the BCSSP block orientated input language.

**BCSSP:** A low cost simulation system applicable to differential and difference equations and offering all features of an analogue system, including graphical output.

**BSETR & BCSSP:** Suitable for engineering, physics, economics, electronic, applied mathematics . . . Ideal for school colleges and universities.

Contact Lesley Hansen for a detailed brochure and information on the **MICROPACS** range of engineering software. aa11b

MICROPACS

**Computer Applications**

Chilworth Research Centre, Southampton, Hampshire, SO1 7NP, England
Tel: (0703) 760085 Telex: 477380 KBCPA G

schools' attention. *Computers, Information and You* from Acorn/CES follows a thematic approach to the subject in which the businesses in a small town are faced with the problems of integrating the new technology into their work. Data handling, design, spreadsheets and problem-solving are tackled in a thorough fashion. Also from Acorn/CES is *The Information Age*, which deals with the implications for the home and studies banking, communications and wordprocessing.

### Excellent package

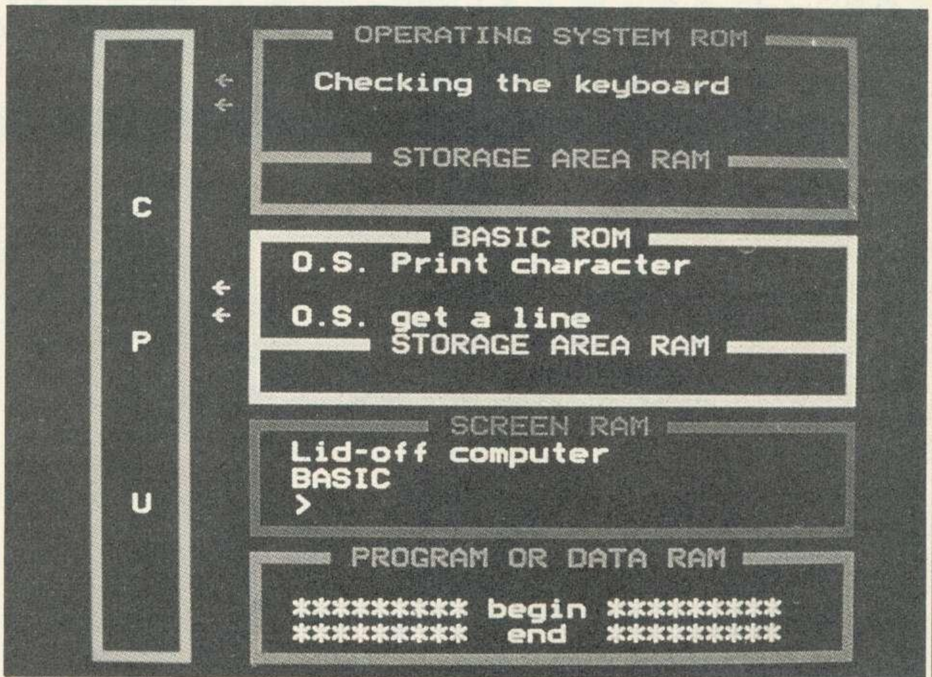
BBC Publications has a more advanced guide to computer use called *Inside Information – Computers, Communications and People.* This package is excellent for a variety of reasons. First, it has appeal at a number of levels. For teachers, as an introduction to computer use in industry it can perform a similar task to the *ISIS* pack on the use of computers in the classroom. Its approach is mature and straightforward. As far as possible it tries to deal with jargon in a sensible way, explaining as it goes and, because of its approach through a variety of media, if its message doesn't get through in one way, it will in another.

The pack contains a substantial colour paperback book, two audio tapes and a pack of software which deals with control, wordprocessing, computer operation and data handling. So complete is this package that the City and Guilds of London Institute has built a course on Information Technology around it.

As explained earlier, computer awareness in education divides into two main areas – pupil awareness of their world and teacher awareness of the possibilities for computer use. This last is likely to be of great importance soon, as the Microelectronics Support Unit swings into action with development of teacher support materials *for existing software* as one of the main aims in its brief.

Despite the widespread availability of both computers and software (see page 159 for a software database which represents only some of the education material currently available) many teachers have not yet ventured into the realm of computer use. Many are intimidated, others apathetic, some frightened. Being naturally resistant to change, many teachers have not taken to the micro in the way one might hope. Moreover, many staff had bad early experiences – programs wouldn't load and when they did they often crashed.

Getting over this antipathy is a problem, not least because of all the recent disruption in education. Nonetheless a number of initiatives are forcing teachers to sit up and take notice, not least among them TVEI (Technical Vocational Education Initiative) which has presented schools involved in the scheme with vast sums of money to spend on integrating technology into the syllabus. The first step in any such enterprise must be teacher education and many of the above packages will work for teacher home-study and in the classroom.




**'*Inside Information* is an excellent package. Its approach is mature and straightforward'**

Children's needs are different. The study of computer use is attractive if it's aimed at the right pupils at the right time. *Inside Information*, for example, would be totally inappropriate at the lower end of the secondary school since it is aimed at the Further Education market. However, studies of computer applications which have links into other curriculum areas expand usefulness to the teachers and get away from the idea that the computer is for use only in the computer room. Take, for example, a component part of the *ISIS* pack – the Lettuce Factory Case Study. This item was devised by Stan Spencer, Advisory Teacher in Computer Education in Sheffield, for use in the lower secondary school. It looks at the effects that computerisation had on a market garden specialising in year-round lettuce production. Not only is the use of the computer important in this package, but also an understanding of the things which the computer is controlling – the biological processes, the environment in the glasshouses, the problems of weather and so on. All of these have links into other areas meaning that a cross-curricular approach can be developed.

Computer awareness must be relevant to both pupils and staff. It must serve to enhance education. It should build a realisation that computers are used in a much broader context than that demonstrated in many schools' computer laboratories. If some of the packages mentioned above achieve only a part of this, they will have been well worth the money.

### PROGRAM DETAILS

**Computers at Work** BBC B, cassette, £19.95
BBCSoft, 35 Marylebone High Street, London W1M 4AA. Tel: 01-580 5577

**Using your Computer** BBC B, disc (Econet compatible), £29.95
BBCSoft, as above

**The Micro at Work Pack 1** BBC B, cassette or disc, £12.42
Mercury Music, Dept MW, PO Box 194, Sevenoaks, Kent TN15 8TZ

**The Micro at Work Pack 2** BBC B, cassette or disc, £12.42
Mercury Music, as above

**The Micro at Work Pack 3** BBC B, disc £17.95
Mercury Music, as above

**ISIS** BBC B, disc, £130
Resource, Exeter Road, off Coventry Grove, Doncaster DN2 4PY. Tel: (0302) 63800

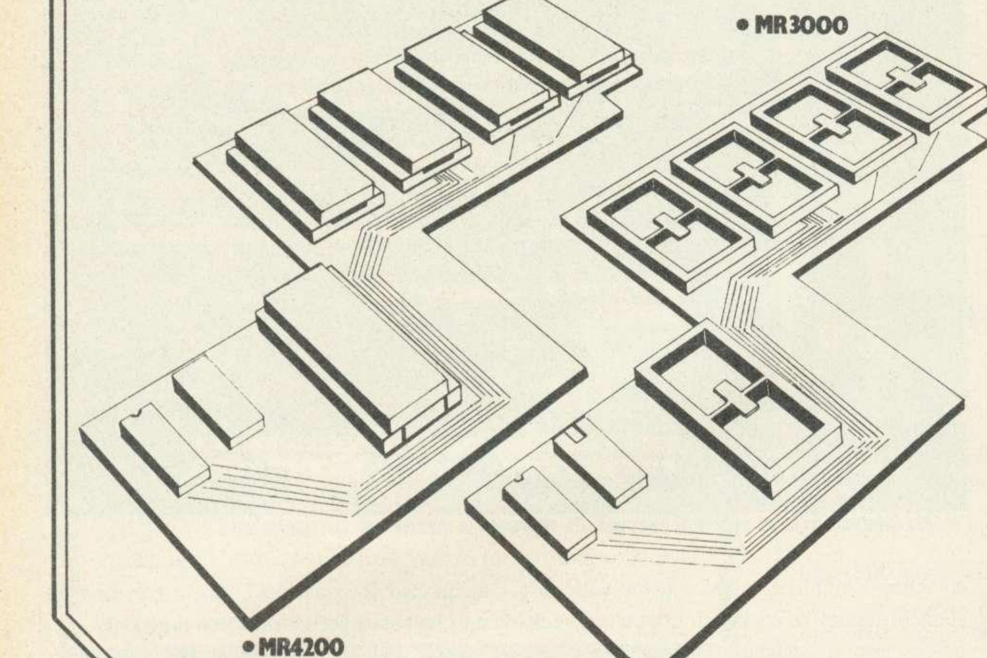
**Inside Information**
BBC B cassette (transferable to disc), £28.85
BBCSoft, as above

**IT in the Secondary School** BBC, disc, £19.95
Resource, as above

**Computers, Information and You** BBC, disc, £28.75
Acorn/CES, 645 Newmarket Road, Cambridge CB5 8PD. Tel: (0223) 214411

**The Information Age** BBC, disc, £34.50
Acorn/CES, as above

# AFTER THE SUCCESS OF MR 2000 PEAR TREE HAS DONE IT AGAIN




## NEW Improved MR3000 & MR4200

- **MR 3000 Mini-Rom Board:** Gives 4 extra Rom sockets on BBC 'B'. Only £17.95 (including VAT/P&P). Full instructions enclosed.
- **MR 4200 Mini 32K Ram Board:** Inclusive of the Hitachi 6264LP-15 Ram. Full software inclusive. Only £31.50 (including VAT/P&P).

Cheques/P.O./Access for above payable to:
Pear Tree Computers Ltd.
Falcon House
70C High Street
Huntingdon
Cambs. PE18 6SS.
Payment by credit card, please quote your number. Tel. (0480) 50595

PEARTREE COMPUTERS



# TUXSOFT

Quality Educational Programs for the BBC B & ELECTRON

*What's the Temperature? with the Ghost Game – Norman Number Man*
*Speed Arithmetic with Number Catch – Number Check*
*Tables Tester with Bonus Shoot Out – Tables Square*

**"TUXSOFT . . . produce a surprisingly high standard in software." ACORN USER JAN. 1986**

Six appealing programs to teach and reinforce important mathematical concepts. Devised and developed by an experienced teacher. Received enthusiastically by schools and in the home. Age range approximately 7 to 14 (all have several difficulty levels).

**PRICES FROM £5.95 for TWO FULL LENGTH PROGRAMS**

**NEW . . . SPELL IT!**
Word recognition and spelling made fun for all the family. Gain a high score to pit your wits in SPEED SPELL. Load files (supplied) to suit different age groups, or parents and teachers make up your own – it is simple!

ALL PROGRAMS AVAILABLE ON TAPE, 5.25" DISC (DFS & ELECTRON CUMANA), PLUS 3 3.5" DISC.
Send for NEW, ***VERY*** COMPREHENSIVE BROCHURE.
TUXSOFT, PO BOX 1, TUXFORD, NEWARK, NOTTS NG22 0JY

AA160



CHALKSOFT ✻ GARLAND ✻ STORM ✻ CAMBRIDGE ✻ H&H ✻ GOLEM

# Looking for the RIGHT Software?

You need the newly published 72 page

## EDUCATIONAL SOFTWARE DIRECTORY

- ✻ **Widest selection of programs — over 500 for the BBC and other computers**
- ✻ **Full program descriptions with screen shots**
- ✻ **Easy ordering and competitive prices**

**Write or phone for your free copy today**

## Rickitt Educational Media

Ilton • Ilminster • Somerset TA19 9HS • (04605) 5152

AA58

SELECTIVE ✻ MACMILLAN ✻ ASK ✻ CLOUD 9
AKADIMIAS ✻ FERNLEAF ✻ BOURNE ✻ SCISOFT ✻ JACARANDA ✻ SULIS
BBC PUBLICATIONS ✻ SHERSTON ✻ 4MATION



0664 63617

# Squirrel's Byte

## Printers (a)

| | | | |
|---|---|---|---|
| Shinwa CPA80 + NLQ | **173.50** | Daisy Junior | **184.00** |
| Kaga KP810 | **216.50** | Juki 6100 | **299.00** |
| Epson LX80 | **209.00** | Brother HR15 | **333.00** |

Other ribbons available – please ring

| | | | | |
|---|---|---|---|---|
| **Ribbons eg** | Shinwa | **3.45** | Epson 80 series | **2.95** |
| | Kaga KP810 | **4.35** | Epson 100 series | **4.85** |
| | Juki 6100 S/S | **1.45** | Seikosha GP80/100/250 | **3.20** |
| | Brother HR15 | **2.95** | Walters WM2000 | **3.85** |
| Cables | 1.5 metre | **6.75** | 2 metre | **7.75** |

## DISK DRIVES (b) + INTERFACES

| | | | |
|---|---|---|---|
| Single sided 40T | **79.50** | Dual SS 40T | **139.50** |
| Double sided 40/80T | **99.95** | Dual D/SidedS 40/80T | **179.50** |
| Single 3.5" D/S 80T | **86.00** | Dual D/S 80T 3.5" | **159.95** |

Additional cost of power supply for above drives: Single 19.00, dual 29.00, 3.5" single 9.95, dual 12.75.

| | | | |
|---|---|---|---|
| Cumana QFS (BBC) | **39.00** | Opus DDOS (with drive) | **39.00** |
| Cumana (Electron) | **60.00** | Acorn DNFS | **63.00** |

## MODEMS (c)

| | | | |
|---|---|---|---|
| Miracle WS2000 | **114.95** | Pace Nightingale | **99.75** |
| (inc. BBC lead) | | Nightingale + Commstar | **117.95** |

**STOP PRESS: Nightingale package for Electron £132.00**

## DISKETTES — POST FREE!

Prices per box of 10

| | 5.25" (100% guarantee) | Verbatim Datalife | Dysan | 3" CF2 | 3.5" |
|---|---|---|---|---|---|
| SS DD 48 tpi | **9.95** | 13.95 | 15.45 | | |
| DS DD 48 tpi | **10.95** | 18.25 | 23.95 | | |
| SS DD 96 tpi | **11.95** | 19.25 | 23.95 | | 23.95 |
| DS DD 96 tpi | **13.95** | 22.25 | 29.95 | 33.70 | 29.95 |

## DISK SERVICING/REPAIR

Rates for service/recalibration and minor repairs *Inclusive of VAT and return P&P:* single drives **£25,** dual drives **£30.**

Please add 15% VAT to all prices (inc. carriages)
Ribbons/interfaces etc **95p** (any quantity)
Carriage rates: (a) **£6.00** (b) **£5.00** (c) **£4.00**
Please telephone if you do not see the item you require.

**Squirrel's Byte**
**7 Coniston Road, Melton Mowbray,**
**Leicestershire, LE13 0NE. Tel: (0664) 63617**

Access

AA8C

# EDUCATION SOFTWARE DATABASE

The selection of records printed on the following pages is taken from the educational software database compiled by Nick Evans for *Acorn User*. The records have been chosen from a variety of subject areas to give an idea of the content of the database. The full range of subject areas covered in the whole package is as follows (the letters in brackets are the key):

(a) Arithmetic
(b) Biology
(c) Chemistry
(d) Economics/Business Studies
(e) English
(f) Road Skills
(g) Geography/Geology
(h) History
(i) Computer Studies/Control
(j) Engineering/Technology
(k) Music
(l) Languages
(m) Mathematics
(n) Number Bonding
(o) Logo
(p) Physics
(q) Quiz, Test or Problem Solving
(r) Rote
(s) Simulation/Adventure
(t) Typing
(u) Statistics
(v) Reading and Spelling
(w) Writing
(x) Recognition and orientation
(y) Library
(z) Astronomy
(aa) Wordprocessing
(bb) Design
(cc) Analysis/Classification
(dd) Database
(ee) Topic Based
(ff) Food and Nutrition
(gg) Graphics and Art
(hh) Assessment
(ii) Ecology
(jj) Authoring
(kk) Careers
(ll) Computers in Schools
(mm)Management
(nn) Sociology and Psychology
(oo) Religious Education

No responsibility is taken for inaccuracy in the listing. As far as possible prices and packages referred to have been checked from latest catalogues where these have been made available. Prices may vary with respect to whether they have been quoted including VAT or not. The machine classification does not exclude the programs from use on later models – it is merely that the publisher does not necessarily state explicitly that his software runs on anything other than BBC micro. See page 145 for an order form.

**4mation,** Linden Lea, Rock Park, Barnstaple EX32 9AQ. Tel: (0271) 45566
**Abacus,** 21 Union Street, Ramsbottom, Lancs
**ABC Primary Software,** 19 Crumstone Court, Killingworth, Tyne and Wear. Tel: 091-268 2627
**Acornsoft,** Technopark, 645 Newmarket Road, Cambridge CB5 8PD. Tel: (0223) 214411
**Addison Wesley,** Finchampstead Road, Wokingham, Berks RG11 2NZ. Tel: (0734) 794000
**AJ Software,** 61 Jeddo Road, London W12 9ED
**Ajax,** 57 Rowley Street, Walsall WS1 2AZ
**Akadamias,** UCNW, Bangor LL57 2DG. Tel: 351151 x354
**Alan Wiltshire,** 12 Barrow Road, Lowestoft NR32 3PN
**Alpha Computer School,** 33 Chesswood Road, Worthing BN11 2AA. Tel: (0903) 210701
**Ampalsoft,** 31 Woodbridge Road, Blackwater, Camberley, Surrey. Tel: (0252) 876677
**AMS Advanced Memory Systems,** 166-170 Wilderspool Causeway, Warrington WA4 6OA. Tel: (0925) 413501
**Argus Press,** 1 Golden Square, London W1R 3AB. Tel: 01-437 0626
**Arnold Wheaton,** Parkside Lane, Dewsbury LS5TD
**ASK,** 32 Bridge Street, Cambridge CB2 1UJ. Tel: (0223) 65445
**ATM,** Kings Chambers, Queen Street, Derby DE1 3DA
**AUCBE,** Endymion Road, Hatfield, Herts. Tel: (07072) 65443
**AVC,** PO Box 415, Harborne, Birmingham B17 0HD

**BBC Publications,** 35 Marylebone High Street, London W1M 4AA. Tel: 01-580 5577 x 4128
**BeeBinEd,** The Coach House, Hunsdonbury, Ware SG12 8PW. Tel: (0920) 870508
**Beebugsoft,** PO Box 50, St Albans, Herts. Tel: (0727) 40303
**Beltech,** College House, St Leonards Close, Bridgnorth, Salop
**BES,** Bourne House, The Hundred, Romsey SO5 8BY. Tel: (0794) 523301
**Betasoft,** 5a St Stephens Road, Cold Norton, Chelmsford CM3 6JE
**BP Education,** PO Box 5, Wetherby LS23 7EH. Tel: (0937) 843477
**Brainstorm,** 103a Seven Sisters Road, London N7 7QN. Tel: 01-263 6926
**Bridge Software,** 103 Hillside Road, Corfe Mullen, Wimborne BH21 3SG
**Brit. Inst. of Traffic Ed. Research,** Kent House, Kent Street, Birmingham B5 6QF. Tel: 021-622 2402
**Bryants,** 5 Renfrew Green, Blakelaw, Newcastle upon Tyne NE5 3TY. Tel: 091-286 6146

**CALL,** Lanchester Poly, Coventry CV1 5FB. Tel: (0203) 24166 x 222
**Camant Software,** 8 Graigstewart Crescent, Alloway, Ayr KA7 4DB. Tel: (0292) 43492
**Cambridge Micro Software,** Edinburgh Bldg, Shaftesbury Road, Cambridge CB2 2RN. Tel: (0223) 312393
**Cambs Cambridgeshire Software House,** Town Hall, St Ives, Huntingdon PE17 4AL. Tel: (0480) 66805
**Capital Media,** John Ruskin Street, London SE5 0PQ. Tel: 01-735 9123
**CCS,** 14 Langton Way, Blackheath, London SE3 7TL. Tel: 01-858 0763
**Centre for Learning Resources,** as Capital Media
**Century,** 12-13 Greek Street, London W1V 5LE. Tel:01-434 4241
**CET,** 3 Devonshire Street, London W1. Tel: 01-580 7553
**Chaddington,** 14 Selkirk Close, Worthing BN13 1PB. Tel: (0903) 501378
**Chalksoft,** PO Box 49, Spalding PE11 1NZ. Tel: (0775) 69518
**Clares,** 98 Middlewich Road, Rudheath, Northwich CW9 7DA. Tel: (0606) 48511
**CLASS,** 93 Bedwardine Road, London SE19 3AY. Tel: 01-771 2496
**Clifton College,** Technical Activities Centre, Bristol BS8 3JH
**Clwyd Technics,** Antelope Industrial Estate, Rhydymwyn, Mold, Clwyd. Tel: (0352) 83751
**COIC,** Manpower Services, Moorfoot, Sheffield S1 4PQ. Tel: (0742) 704563
**Collins,** 8 Grafton Street, London W1X 3LA. Tel: 01-493 7070
**Complete,** 32-38 Osnaburgh Street, London NW1 3ND. Tel: 01-387 9503
**Computer Concepts,** Gaddesden Place, Hemel Hempstead HP2 6EX. Tel: (0442) 63933
**Computercat,** 224 Chapel Street, Leigh, Lancs
**Comsoft,** 67 Kent Road, Harrogate HG1 2NH. Tel: (0423) 57464
**Contex,** 15 Woodlands Close, Cople, Bedford MK44 3UE. Tel: (023) 03347
**Corona,** 73 High Road, South Woodford, London
**CRAC,** Bateman Street, Cambridge CB2 1LZ. Tel: (0223) 354551
**Creative Sparks,** 296 Farnborough Road, Farnborough GU14 7NU. Tel: (0252) 543333

**Daco,** 59 Mackenzie Road, Moseley, Birmingham. Tel: 021-449 2253
**Database Publications,** 68 Chester Road, Hazel Grove, Stockport SK7 5NY. Tel: 061-456 8383
**Datapen,** Kingsclere Road, Overton, Hants
**Dial Software,** 72 Downend Road, Downend, Bristol, Avon
**Digital Services,** 159 Havant Road, Drayton, Portsmouth PO6 2AA. Tel: (0705) 324934
**Doctor Soft,** 258 Coneygree Road, Peterborough, Cambs. Tel: (0903) 206076
**Drake,** St Fagan's Road, Fairwater, Cardiff CF5 3A. Tel: (0222) 560444

**Earth Science,** MJP, Freepost PO Box 23, Faversham, Kent. Tel: (0795) 534690
**Ed Tech Services,** The Barn, Thorney, Peterborough PE6 0GA. Tel: (0733) 270875
**EdSoft,** 12 Cotmore Close, Brixham TQ5 0EF Tel: (080 45) 3603
**Educated Owl,** 62 Airedale Avenue, Tickhill, Doncaster, S Yorks
**Educational Admin. Software,** Somerville House, Brunswick Road, Withington M20 9GA. Tel: 061-445 1379
**Educational Software,** 108 Parthenon Drive, Liverpool L11 7AQ
**Edward Arnold,** 41 Bedford Square, London WC1B 3DQ. Tel: 01-637 7161
**Englefield,** High House, Mill Street, Buxton, Norwich, Norfolk
**Ephagy Software,** 125 Corporation Road, Grimsby DN31 1UR. Tel: (0482) 812902
**ESM,** 32 Bridge Street, Cambridge CB2 1UJ. Tel: (0223) 65445

**Fernleaf,** 31 Old Road West, Gravesend DA11 0LH. Tel: (0474) 359037
**Flite,** Conway, County Donegal, Eire
**Focusplan,** 57 Westgate, Cleckheaton, W Yorks
**Foulsham Educational,** Yeovil Road, Slough SL1 4JH
**Franklin Watts,** 12a Golden Square, London W1R 4BA. Tel: 01-437 0713
**Fsoft,** PO Box 352, Brighton BN1 3AY. Tel: (0273) 736042

**Garland Computing,** 35 Dean Hill, Plymouth PL9 9AF. Tel: (0752) 41287
**GED,** 70 Stoke Road, Bletchley, Bucks
**GEM,** 1 Oswald Road, Leamington Spa, Warwicks
**Gemini,** Gemini House, Concorde Road, Exmouth EX8 4RS. Tel: (0395) 265165

# TIGER SOFTWARE

**Supplier of software and hardware to the home & business micro user.**

MARCH MAIL-ORDER MADNESS!!

**CHECK OUR LOW PRICES!!**

**ALL PRICES INCLUDE VAT**

**EPSON P40 PRINTER ONLY £50.75 + £4 CARRIAGE**

**PRINTERS**

| | | | |
|---|---|---|---|
| Epson LX-80 | £225.00 | Epson RX-100 | £282.90 |
| Epson FX-85 | £389.95 | Epson FX-105 | £499.95 |
| Epson FX-80+ | £339.25 | **New** Epson LQ-800 | £541.65 |

| | |
|---|---|
| Epson JX-80 seven colour printer | £476.25 |
| Epson DX-100 daisy wheel printer | £356.50 |
| Quen Data DWP 1120 daisy wheel printer | £159.95 |
| **New** Shinwa/CPA 80+ **(NLQ)** offer | £185.00 |
| Mannesmann Tally MT80+ | £189.00 |

**CARRIAGE ON PRINTERS £6**

New Citizen 120D 80 column printer with 120cps draft and 25cps NLQ, including Tractor unit + 2 year warranty! Only . . . £215.00

**Seikosha GP50/0 80 column/pin feed £124.95**

**NEW STAR NL10 PRINTER LAUNCH OFFER!**
120 cps + **55 cps NLQ** With TRACTOR £238.95

BBC Parallel Cable £8.25

**COLOUR MONITORS**

Microvitec 1431 colour £205.85
Microvitec 1451 colour £258.75
Fidelity colour monitor £189.75
Fidelity TV/Monitor £209.95

**CUMANA QUALITY DISK DRIVES**

| | | |
|---|---|---|
| CSX100 £88.95 | (CARRIAGE ON100 | CS100 £109.95 |
| CSX400 £125.95 | DISK DRIVES £4) | CS400 £139.95 |
| CDX200 £165.95 | **NB** FURTHER PRICE | CS200 £193.20 |
| CDX800 £229.85 | RISE EXPECTED) | CD800 £259.95 |

**Cumana QFS Double-Density Disk Interface for BBC, only £44.95**
**Cumana Double-Density Disk Interface for ELECTRON only £68.75**
**Cumana top quality DS/DD (96 t.p.i.) 5.25" box of 10 Disks special price only £17.95 + £1 post & packing.**
**Cumana** Touch Pad + Screen Artist £38.95 (p + p £2)

**NEW BBC MASTER 128 COMPUTER – Telephone!**

**AMX** MOUSE + SUPER ART only £81.65 (p + p £1.50)

**AKHTER/MITSUBISHI QUALITY DISK DRIVES + 2 YEAR WARRANTY.**
**– All 40/80 TRACK SWITCHABLE + FREE UTILITIES DISK!**
MD400A (400K) £124.95 MD 400B + PSU £152.95
MD 802 E DUAL 400K WITH PSU £274.95
MD 802D DUAL 400K + PSU IN METAL MONITOR STAND £294.95

**SPECIAL DE-LUX COMPUTER & 5¼" DISK DRIVE MAINTENANCE KIT**
DISPLAY **CASE** CONTAINS HEAD CLEANER DISK & CLEANER FLUID, VDU/KEYBOARD & PLASTIC CLEANERS, ANTI-STATIC CLOTHS, BLOWER BRUSH, TWO ATOMISERS AND MORE!
**SAVE £5** – ONLY £16.95 + £2 p & p

**The UNIQUE UNIBOX Disk Filing and Storage system:**
* 8 individually enclosed flip-back compartments
* Accepts up to 80 5.25" disks
* Guards against bending of disks
* Ideal protection against dust, dirt and smoke
* high quality plastic material with anti-static treatment
* complete with erno file-labelling system for instant access
* compact size: 257mm x 173mm
* **PRICE only £12.75 + £1.75 post & packing**

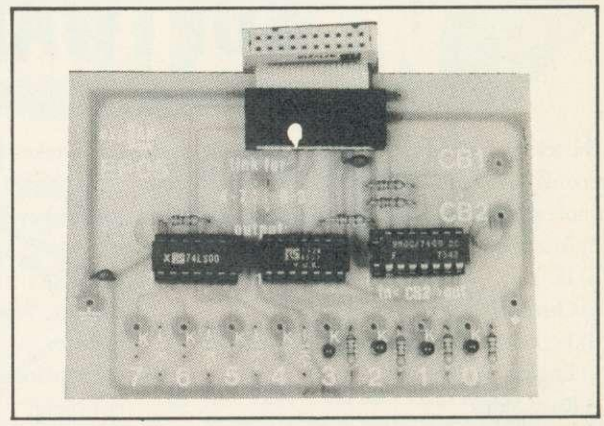
**Unibox complete with 25 top grade SS/DD Disks only £35.60**
**Unibox complete with 25 top grade DS/DD Disks only £40.60**
Post & packing for Unibox with disks is £2.25

**EDUCATION ORDERS ALSO SUPPLIED**

NEW RETAIL ADDRESS
**TIGER SOFTWARE**
**66 ST. MICHAELS LANE, BRIDPORT, DORSET DT6 3RB**
**TELEPHONE 0308 27691**

AA112

# BUFFERING?



## EXPLAN EP05 BUFFER BOARD

The EP05 Buffer Board is designed for the BBC Model B. It is available as a complete construction kit or simply as a plain circuit board. The board can be set up for 8 inputs, or 8 outputs, or 4 in/out, by component selection. Both control lines are available and there are LED indicators on data lines, which can drive 6V torch bulbs. Each board comes complete with parts list and comprehensive instructions.

| | | |
|---|---|---|
| I-EP05 | Printed Circuit Board | £4.50 |
| I-EP05/B | PCB plus ribbon cable made up IDC connectors | £12.00 |
| I-EP05/C | All components, PCB Ribbon Cable and connectors | £17.00 |

ALL PRICES INCLUDE VAT. PLEASE ADD £1.50 P&P.

**COMMOTION**
THE TECHNOLOGY SUPPLIER
241 GREEN ST.
ENFIELD EN3 7SJ
01-804 1378

# Soft-Teach Educational

**MAP READING SOFTWARE**
* Full colour, look alike O.S. maps.
* "Walk" the roads and footpaths.
* Four separate screen displays making one map.
* Large library of problems
* Package includes a coloured map, manual etc.

**GENERAL MAP READING**
* Deals with O.S. map symbols, grids, scale and direction. **£23 inc VAT.** Network **£46 inc VAT.**

**COASTAL MAP READING**
* Deals with coastal features, symbols and height. **£23 inc VAT.** Network **£46 inc VAT.**

These substantial packages are graphically exciting, educationally sound and straight-forward to use.

**AVAILABLE FOR BBC B, SPECIFY 40/80 TRACK AND STAND ALONE/NETWORK**

**Order for both packages £40 (network £80) inc VAT.**
**Send cheque/P.O. to:**
**Soft-Teach Educational, Sturgess, Longbridge Deverill, Warminster, Wilts BA12 7EA.**

**EDUCATIONAL AND FUN**

Soft-Teach Educational.

Other Soft-Teach programs available from:
Longman Micro Software, 33–35 Tanner Row, York YO1 1JP—include:
Weather Forecasting (BBC & Apple),
Chemdata (BBC & Apple translations)
and Climates (Apple translations)

# EDUCATION

**Gibsoft,** 38-42 Peveril Street, Nottingham
**Gifted Children Info Centre,** 21 Hampton Lane, Solihull B91 2QJ. Tel: 021-705 4547
**Ginn & Co,** Prebendal House, Parsons Fee, Aylesbury, Bucks
**Glentop,** Bath Place, High Street, Barnet, London EN5 1ED. Tel: 01-441 4130
**Golem,** 77 Qualitas, Bracknell RG12 4QG. Tel: (0344) 50720
**Greenwood,** Lower Bockhampton, Dorchester DT2 8PZ
**Griffin and George,** 285 Ealing Road, Alperton, Wembley HA0 1HJ. Tel: 01-497 3344
**GSN,** 214 Stamford Street, Ashton under Lyne OL6 7LR. Tel: 061-339 6635

**H&H,** 53 Holloway, Runcorn WA7 4TJ. Tel: (09285) 65566
**Hargreaves,** Updown, Pewley Way, Guildford, Surrey
**Heinemann,** Windmill Press, Kingswood, Tadworth KT20 6TG. Tel: (0737) 833511
**Herdman,** 43 St Johns Drive, Clarborough, Retford DN22 9NN
**Highlight Software,** 36 Sherbourne Close, Barry CF6 5AQ. Tel: (0446) 745482
**Hilditch Software,** 4 Church Road, Felixstowe IP11 9NF. Tel: (0394) 271747
**Hill MacGibbon,** 8 Grafton Street, London W1X 3LA. Tel: 01-493 7070
**Himap,** 8 Wishart Road, Kidbrooke SE3 8PP
**Hodder and Stoughton,** Mill Road, Dunton Green, Sevenoaks, Kent
**Hutchinson,** 62-65 Chandos Place, London WC2N 4NW. Tel: 01-240 3411

**Ian Copestake,** 23 Connaught Crescent, Brookwood, Woking, Surrey. Tel: (0486) 74755
**Ibbotson Design Software,** The Byre, Ecclesbourne Lane, Idridgehay DE4 4JB. Tel: (077 389) 658
**IEC,** 77 Orton Lane, Wombourne, Wolverhampton WV5 9AP. Tel: (0902) 892599
**IJK Software,** 9 King Street, Blackpool, Lancs
**In-Service Systems,** 186 Devizes Road, Salisbury, Wiltshire
**In-sight,** 3 The Witheys, Wanborough, Swindon SN4 0BQ
**Innovative Software,** 41 Walter Road, Swansea, West Glam
**Interface,** 9-11 Kensington High Street, London W8
**IRL Press,** PO Box 1, Eynsham, Oxford OX8 1JJ
**ISMeC,** Westminster College, North Hinksey, Oxford OX2 9AT

**Kingfisher,** 16 Martock Road, Keynsham, Bristol BS18 1XA. Tel: (02756) 68152
**Kosmos,** 1 Pilgrims Close, Harlington, Dunstable, Beds. Tel: (05255) 3942/5406

**LCL,** 26 Avondale Avenue, Staines, Middx. Tel: (0784) 58771
**Learnwell,** 152 Westmorland Road, Wyken, Coventry, Warwicks
**Letts,** Diary House, 77 Borough Road, London SE1 1DW. Tel: 01-407 8891
**Linear Graphics,** 28 Purdeys Way, Rochford SS4 1NE. Tel: (0702) 541664/5
**Logical Software,** Scientific House, Bridge Street, Sandiacre, Notts. Tel: (0602) 394000
**Logo Software,** 316a Richmond Road, Twickenham TW1 2PD. Tel: 01-891 0989
**Logotron,** 59 Markham Street, London SW3 4ND. Tel: 01-352 1088
**Longman,** Burnt Mill, Harlow CM20 2JE. Tel: (0279) 26721
**LPA,** Studio 4, Royal Victoria Pat Building, London SW18 3SX. Tel: 01-871 2016
**LTS,** Haydon House, Alcester Road, Studley, Warwicks. Tel: (0386) 792617

**Macdonand,** 74 Worship Street, London EC2A 2EN. Tel: 01-377 4600
**Macmillan,** Little Essex Street, London WC2R 3LF. Tel: 01-836 6633
**Management Data Systems,** 108 Parthenon Drive, Liverpool L11 7AQ. Tel: 051-226 1214
**McGraw-Hill,** Shoppenhangers Road, Maidenhead, Berks. Tel: (0628) 23432
**McHugh Enterprises,** 43 Hookstone Oval, Harrogate HG2 8QE
**MedStat,** City House, Maid Marian Way, Nottingham NG1 6BH. Tel: (0602) 411120
**MEDUSA,** Bishop Grosseteste College, Lincoln LN1 3DY. Tel: (0522) 44713
**MegaCyCAL,** PO Box 6, Birkenhead L43 6XH. Tel: 051-652 3139
**MEI,** 41A West Street, Oundle, Peterborough PE8 4EJ. Tel: (0832) 73444
**Micro Power,** 9-8a Regent Street, Chapel Allerton, W Yorks
**Micro-aid,** 25 Fore Street, Praze, Camborne, Cornwall
**Micro-Jenn,** 81 Squirrels Heath Road, Harold Wood, Romford RM3 0LD
**Microwave,** 24 Belford Road, Stretford, Manchester
**Mirrorsoft,** 74 Worship Street, London EC2A 2EN. Tel: 01-377 4837
**Modular Resources,** 12 Ledger Lane, Lofthouse, Wakefield WF1 2PH
**MRH,** 20 Highfield Road, Kidderminster DY10 2TL
**Mupados,** Unit 11, Llambed industrial Estate, Lampeter SA48 8LT. Tel: (0570) 422877
**MUSE,** PO Box 43, Hull HU1 2HD
**Musicsoft,** 12 Fallowfield, Ampthill, Beds. Tel: (0525) 402701

**NEC,** 18 Brooklands Avenue, Cambridge CB2 2HN. Tel: (0223) 316644
**Nelcal (Nelson),** Mayfield Road, Walton on Thames KT12 5PL. Tel: (0932) 246133
**Nisbet,** Digswell Place, Welwyn, Herts. Tel: (0707) 667183
**Nordis,** Cornhill Close, Northampton NN5 7UB
**Notts CC,** Trent Bridge House, Fox Road, Nottingham NG2 6BJ
**Notts Ed Suppliers,** 17 Ludlow Hill Road, West Bridgford NG2 6BJ

**Oertling Avery,** Smethwick, Warley B66 2LP. Tel: 021-558 1112
**Opalsoft,** 112 Arterial Road, Eastwood, Leigh on Sea, Essex
**Optima,** 68 chester Row, Hazelgrove, Stockport SK7 5NY
**Orion Software,** 11 Buttercup Close, Harold Wood RM3 0XF
**Oxford Microware,** 52 St Giles, Oxford OX1 3LU. Tel: (0865) 54505
**Oxhey Tutors,** 19 Tutor Wall, Watford WD2 4NY

**Paean Systems,** Quebec House, Little Bealings, Woodbridge IP13 6LT. Tel: (0473) 623757
**Page,** 17 Pagefield Crescent, Clitheroe BB7 1LH
**Pan Books,** 18-21 Cavaye Place, London SW10. Tel: 01-373 6070
**Pee Bee,** 8 Beechwood Road, Chippenham, Wilts
**Peter Sharpe,** Llwydfan, Minffordd Road, Penrhyndeudraeth LL48 6AU. Tel: (0766) 770528
**Philip Harris,** Lynn Lane, Staffs WS14 0EE. Tel: (0543) 480077
**Pilot One,** 22 Campbell Road, Bedford MK40 3DD. Tel: (0234) 327688
**Pitmansoft,** 128 Long Acre, London WC2. Tel: 01-379 7383
**Primary Programs,** Claypits, Debden Road, Saffron Walden, Essex
**Primasoft,** 2 Spinney Close, Glossop, Derbys
**Private Tutor,** 29 Hollow Way Lane, Amersham HP6 6DJ. Tel: (02403) 21702
**Promotional ArtWork Systems,** 9 Mayo Close, Leeds LS8 2PX
**Psion,** Harcourt Street, London W1H 1DT. Tel: 01-723 9408

**Quicksilva,** 13 Palmerston Road, Southampton SO1 1LL (0703) 220169
**Quixtor,** 7 Haslemere Avenue, Hale Barns WA15 0AU

**RESOURCE,** Exeter Road, Doncaster DN2 4PY. Tel: (0302) 63800
**Reeves,** 24 Carthona Drive, Fleet GU13 9SF. Tel: (02514) 4674
**RH Electronics,** Chesterton Mill, Frenchs Road, Cambridge CB4 3NP
**RJE Software,** 143 Montague Road, London E11 3EW
**RoSPA,** The Priory, Queensway, Birmingham B4 6BS. Tel: 021-223 2461

**S&S Schofield & Sims,** Dogley Mill, Fenay Bridge, Huddersfield HD8 0NQ. Tel: (0484) 607080
**School Software,** Meadowvale Estate, Raheen, Limerick, Ireland. Tel: 061-27994
**Schoolfax,** 24 Somerset Road, Swindon SN2 1NF. Tel: (0793) 695296
**Schoolsoft,** 19 Shadwell Grove, Radcliffe, Notts
**Scisoft,** 5 Minster Gardens, Newthorpe, Nottingham NG16 2AT. Tel: 764501
**Selective Software,** 64 Brooks Road, Street BA16 0PP
**SESS,** 275-277 Bath Road, Bristol. Tel: (0272) 710103
**Shards,** 189 Eton Road, Ilford, Essex
**Sherston Software,** 8 Court Street, Sherston, Malmesbury SN16 0LL. Tel: (0666) 840433
**Shumwari Associates,** 12 Marlin Court, Marlow SL7 2AJ. Tel: (062 84) 5751
**Sigma,** as Wiley
**Siverlind,** 156 Newton Road, Burton-on-Trent, Staffs. Tel: (0283) 63987
**Silversoft,** Unit 7D Kings Yard, Carpenters Road, London E15 2HD. Tel: 01-985 5614
**Simon Hessell,** 15 Lytham Court, Sunninghill, Berks
**Simonsoft,** 25 Tatham Road, Abindgon OX14 1QB
**Social Science Software,** Freepost, Birkenhead L42 2AB
**Soft Warehouse,** 285 Oldbury Road, Worcester, Worcs. Tel: (0623) 25307
**Square Software,** 12a Uplands Terrace, Swansea, W Glamorgan
**SRA,** Newtown Road, Henley on Thames RG9 1EW. Tel: (0491) 575959
**Star Devices,** 22 Hyde Street, Winchester SO23 7DR. Tel: (0962) 63626
**Storm Software,** Newbury Court, Gillingham SP8 4QX. Tel: (07476) 2774
**Strawberry Fair,** 15 Walker Road, Portsmouth PO2 8PQ. Tel: 697867
**Sulis,** as Wiley
**SUMS,** University College of Swansea, Swansea SA2 8PP
**Superior Software,** 69 Leeds Road, Bramhope, Leeds, W Yorks
**Surrey County Council,** Highway House, Chessington Road, Epsom KT17 1TT
**Synergy,** 7 St Andrews Close, Slip End, Luton, Beds
**Syntax,** 16 Woodburn Drive, Bolton BL1 6NM. Tel: (0204) 47321
**SYSTEM,** 12 Collegiate Crescent, Sheffield S10 2BA. Tel: (0742) 682321

**Taskmaster,** Morris Road, Clarendon Park, Leicester LE2 6BR
**Tasman Software,** 17 Hartley Crescent, Leeds, W Yorks. Tel: (0532) 438301
**Tecmedia,** 5 Granby Street, Loughborough LE11 3DU. Tel: (0509) 230248
**Tectel,** Telford ITEC, Halesfield 14, Telford, Salop. Tel: (0952) 581738
**Timetable Systems,** 39 Somerset Road, Frome BA11 1HD. Tel: (0373) 63749
**Toad Educational Computing,** 8 Westbourne Grove, Sale M33 1RP. Tel: 061-969 4740
**Tom Shipman,** PO Box 406, Brentwood CM13 3QE
**Tressell,** Unit 3, 22 Campbell Road, Brighton BN1 4QD. Tel: (0273) 600186
**Tutor Software** 58 Kingsdale Park, Belfast BT5 7BZ. Tel: (0232) 796794
**Tutorial Software,** as Earth Science
**Tuxsoft,** PO Box /1, Tuxford, Newark NG22 0JY. Tel: (0623) 863952

**Unilever Educational,** PO Box 68, Unilever House, London EC4P 4BQ. Tel: 01-822 6727
**University Software,** PO Box 383, London N6 5UP. Tel: 01-883 7155

**Viztech,** 11 Teasdale Road, Carlisle CA3 0HF. Tel: (0228) 35966

**Weaversoft,** 22 Lodge Drive, Northwich CW9 8RQ
**Wida,** 2 Nicholas Gardens, London W5 5HY. Tel: 01-567 6941
**Widgit,** 48 Durham Road, East Finchley, London N2 9DT. Tel: 01-444 5285
**Wigmore House,** 32 Savile Row, London W1X 1AG. Tel: 01-734 8826
**Wiley Software,** Baffins Lane, Chichester PO19 1UD
**Wilson Software,** Freepost, Ormskirk, Lancs. Tel: (0695) 72449

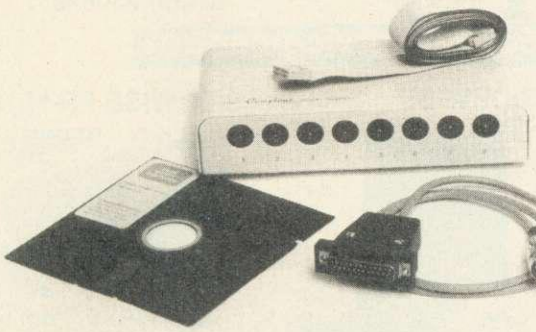
**Yorke House,** Pendower Hall, West Road, Newcastle Upon Tyne NE15 6PP. Tel: 091-274 3620

# EDUCATION SOFTWARE GUIDE

| TITLE | PUBLISHER | PRICE | MACHINE | AGE | TYPE |
|---|---|---|---|---|---|
| **BIOLOGY** | | | | | |
| 16+ Biology | Herdman | £12.95 | B | Sec | b |
| Action of the Heart | Garland | £11.75 | B,B+,Electron | Sec | b,s |
| Animal Physiology Pack | Longman | £40.25 | B,Econet | Sec | b |
| Bio Wood | Solent | £9 | B | J/S | b,s |
| Biochemistry/Molecular Biology Disc | Garland | £35.25 | B | Sec | b |
| Biochemistry and Plant Physiology | Longman | £40.25 | B,Econet | Sec | b |
| Biology Revision | Abacus | £12.95 | B | Sec | b |
| Biology | Longman | £20 | B | Sec | b |
| Biology 1 & 2 | Nelcal | £30.48 | B,Econet | Sec | b |
| Biology | Tom Shipman | £7.99 | B,Electron | Sec | b |
| Biology | School | £12.95 | B,Econet | Sec | b |
| Biomass | Longman | £20.13 | B,Econet | Sec | b |
| Bioscience | IRL | £22.50 | B | Sec | b |
| Blood Circulation | Garland | £11 | B,B+,Electron | Sec | b,s |
| Blood Sugar | Longman | £20.13 | B,Econet | Sec | b |
| Body Processes and the Fate of Protein | Garland | £10 | B | Sec | b |
| Chromosome Mapping | Garland | £10 | B | Sec | b |
| Compete | Edward Arnold | £15 | B | Sec | b |
| Disease Dodgers | Macmillan | £6.95 | B | J/S | b |
| DNA Structure | Garland | £16.50 | B,B+,Electron | Sec | b |
| Ecology | Garland | £23 | B,B+,Electron | Sec | b |
| Enzkin | Edward Arnold | £15 | B | Sec | b |
| Enzyme Kinetics | Edward Arnold | £16 | B | Sec | b |
| Evolution and Natural Selection | Edward Arnold | £16 | B | Sec | b |
| Evolut | Edward Arnold | £15 | B | Sec | b |
| Eye | Longman | £20.13 | B | Sec | b |
| Fantastic Voyage | KA Spencer | £12.95 | B | Sec | b |
| Female Reproduction | Garland | £12 | B,B+,Electron | Sec | b |
| Female Reproductive Cycle | Longman | £17.83 | B | Sec | b |
| Flowering in Soya Bean | Longman | £20.13 | B,Econet | Sec | b,s |
| Genetic Code | IRL | £22.50 | B,B+,Econet | Sec | b |
| Genetic Code Mutation | Garland | £15 | B,B+,Electron | Sec | b |
| Genetics Disc | Garland | £31.75 | B | Sec | b |
| Genetics "A" | Akadamias | £9.95 | B,Econet | Sec | b |
| Genetics with Budgerigars | Edward Arnold | £26.50 | B | Sec | b |
| Glycolysis | Garland | £15 | B,B+,Electron | Sec | b |
| Graphic Biology – Nerve Impulse | Longman | £20.13 | B | Sec | b |
| Growth of Microbes | Longman | £17.83 | B | Sec | b |
| Heart & Kidney | Garland | £11.26 | B,B+,Electron | Sec | b |
| Heredity | Longman | £40.25 | B,Econet | Sec | b |
| Human Blood Groups | Garland | £12 | B,B+,Electron | Sec | b |
| Human Biology 1 & 2 | Garland | £31.75 | B,B+,Electron | Sec | b |
| Human Energy | Longman | £20.13 | B,Econet | Sec | b |
| Inheritance | Garland | £11.75 | B,B+,Electron | Sec | b |
| Introductory Genetics | Garland | £17.25 | B | Sec | b |
| Kidney Nephron | Longman | £20.13 | B | Sec | b |
| Lake Web | Solent | £12 | B | J/S | b,s |
| Leaves | Heinemann | £13.80 | B | J/S | b,x |
| Metabolic Pathways | Longman | £20.13 | B,Econet | Sec | b,s |
| Microcomputers in Biology | IRL | £61.19 | B,Econet | Sec | b,ll |
| Microdiet | Longman | £31.63 | B,Econet | Sec | b,ff |
| Moths, Mice and Other Beasties | Longman | £20.13 | B | Sec | b |
| Multifactorial Inheritance | Longman | £20.13 | B,Econet | Sec | b |
| Muscle Contraction | IRL | £22.50 | B,B+,Econet | Sec | b |
| Naming Organic Compounds | Longman | £28.75 | B | Sec | b,c |
| Nerve Impulse | Longman | £20.13 | B | Ju | b |
| Nucleic Acid Structure | IRL | £25.08 | B,B+,Econet | Sec | b |
| Photosynthesis | IRL | £25.08 | B,B+,Econet | Sec | b |
| Photosynthesis | Longman | £14.50 | B,Econet | Sec | b |
| Photosynthesis | Garland | £16.50 | B,B+,Electron | Sec | b |
| Physiological Simulation | Heinemann | £20.12 | B | Sec | b |
| Plant Biology Disc | Garland | £34.50 | B | Sec | b |
| Plant Competition | Edward Arnold | £16 | B | Sec | b |
| Plant Ecology | Earth Science | £15 | B | Sec | b,ii |
| Pond Animals | Heinemann | £10.93 | B | J/S | b,x |
| Pond Ecology | Longman | £20.13 | B,Econet | Sec | b |
| Population Dynamics | Edward Arnold | £16 | B | Sec | b,ii |
| Population Genetics | Garland | £15 | B,B+,Electron | Sec | b |
| Prey | Longman | £20.13 | B,Econet | Sec | b |
| Protein Puzzle | Garland | £11.75 | B,B+,Electron | Sec | b |
| Protein Structure | IRL | £22.50 | B,B+,Econet | Sec | b,c |
| Relationships | BBC | £17.20 | B | Sec | b,s |
| Seed Germination | Garland | £16.50 | B,B+,Electron | Sec | b |
| Suburban Fox | Ginn & Co | £36.80 | B | J/S | b,s |
| Super Seed | Cambridge Micro | £11.71 | B | J/S | b |
| Synthesis of Ammonia | Edward Arnold | £13.04 | B | Sec | b |
| Transpiration | Garland | £10 | B | Sec | b |
| Water relations | Garland | £11 | B,B+,Electron | Sec | b |
| **CHEMISTRY** | | | | | |
| 16+ Chemistry | Herdman | £12.95 | B | Sec | c |
| Acid-Alkali Titrations | Nelcal | £24.50 | B,Econet | Sec | c |
| Advanced Physical Chemistry | Herdman | £12.95 | B | Sec | c |
| Advanced Inorganic Chemistry | Herdman | £12.95 | B | Sec | c |
| Atoms and Moles | Griffin | £9.95 | B | Sec | c |
| Balance Monitor | Oertling Avery | £40 | B | Sec | c,b,p |
| Balancing Equations | Longman | £18.34 | B,Econet | Sec | c |

| TITLE | PUBLISHER | PRICE | MACHINE | AGE | TYPE |
|---|---|---|---|---|---|
| Bonding | BBC | £17.20 | B | Sec | c |
| Can we trust the breathalyser? | Modular | £37.50 | B | Sec | c,p,b |
| Cars – Maths in Motion | Cambs Software | £18 | B | | |
| Chemi Plant | H&H | £7.50 | B | Sec | c,s |
| Chemical Analysis | Acornsoft | £10.20 | B | Sec | c |
| Chemical Collisions | Cambridge Micro | £17.80 | B,Econet | Sec | c |
| Chemical Database | Longman | £21 | B | Sec | c,dd |
| Chemical Element | Longman | £20.13 | B,Econet | Sec | c |
| Chemical Calculation | Ardsoft | £6 | B | Sec | c |
| Chemical Equations | Garland | £12.95 | B,B+,Electron | Sec | c |
| Chemical Structures | Acornsoft | £10.20 | B | Sec | c |
| Chemical Kinetics | Heinemann | £16 | B | Sec | c |
| Chemical Reaction Kinetics | GSN | £14.38 | B | Sec | c,s |
| Chemical Simulations | Acornsoft | £10.20 | B | Sec | c,s |
| Chemistry Disc | Garland | £34.50 | B | Sec | c |
| Chemistry "A" | Longman | £28.75 | B,Econet | Sec | c |
| Chemist | MUSE | £9 | B | Sec | c |
| Chemistry | Micro Power | £6.95 | B | Sec | c |
| Chemistry Problem | Garland | £30 | B,B+,Electron | Sec | c |
| Chemistry Revision | Abacus | £12.95 | B | Sec | c |
| Chemistry Software | Pitman | £22.94 | B | Sec | c |
| Chemistry Pack | Longman | £23 | B | Sec | c |
| Chemistry | School | £12.95 | B,Econet | Sec | c |
| Compounds | Longman | £20.13 | B,Econet | Sec | c |
| Crystal Structure | Earth Science | £12.95 | B | Sec | c,p |
| Crystals | Earth Science | £13.95 | B | Sec | c,g |
| Dynamic NMR | Microwave | £9.50 | B | Sec | c |
| Elements and Compounds | Garland | £11 | B,B+,Electron | Sec | c |
| Forensic | AVC | £3 | B,B+ | Sec | c |
| Forensic | Chalksoft | £17.50 | B | Sec | c |
| Formulae Game | Longman | £20.13 | B | Sec | c |
| Formula Package | Cloud 9 | £8.50 | B | Sec | c |
| Formulae and Compounds | Griffin | £9.95 | B | Sec | c |
| Gas Chromatography | Longman | £20.13 | B,Econet | Sec | c,cc |
| Gas Expansion | Garland | £11 | B,B+,Electron | Sec | c |
| Gas Laws | Longman | £20.13 | B,Econet | Sec | c |
| Homogenous Equilibrium | Longman | £20.13 | B,Econet | Sec | c |
| How can you make a material with thousands of uses? | Modular | £37.50 | B | Sec | c |
| How can we reduce the world food shortage? | Modular | £37.50 | B | Sec | c |
| How did Early Chemists predict unknown elements? | Modular | £37.50 | B | Sec | c |
| How did 14th cent. glaziers produce coloured glass? | Modular | £37.50 | B | Sec | c |
| Industrial Chemistry Pack | Longman | £28.75 | B | Sec | c |
| Inorganic Analysis | Garland | £12.95 | B,B+,Electron | Sec | c |
| Introducing Science | CET | £7 | B | Ju | c |
| Minerals | Earth Science | £13.95 | B | Sec | c,g |
| Mole Concept | BBC | £13.04 | B | Sec | c |
| Moving Molecules | Cambridge Micro | £15.95 | B,Econet | Sec | c,s |
| Nelson Advanced Chemistry | Nelcal | £30.48 | B | Sec | c |
| Organic Analysis | Longman | £20.13 | B,Econet | Sec | c |
| Organic Synthesis | Longman | £20.13 | B | Sec | c |
| Passit Inchem | Ed Soft | £7.95 | B | Sec | c |
| Passit Redox | Ed Soft | £5.95 | B | Sec | c |
| Periodic Table of the Elements | Peter Sharpe | £4.95 | B | Sec | c |
| Periodic Properties | Hodder | £22.43 | B | Sec | c |
| Physical Chemistry Pack | Longman | £34.50 | B | Sec | c |
| Polymers | BBC | £23 | B | Sec | c |
| Qbank Chemistry | In-sight | £30 | B | Sec | c,hh |
| Rates of Reaction | Longman | £20.13 | B,Econet | Sec | c |
| Reaction Maze | Nelcal | £24.50 | B,Econet | Sec | c |
| Secondary Science | Heinemann | £13.80 | B | Sec | c,p,b |
| Science | Shards | £6.95 | B,Electron | Sec | c |
| Stoichiometry of Ionic Compounds | Nelcal | £24.50 | B,Econet | Sec | c |
| Symbols Formulae and Valency | Garland | £12.95 | B | Sec | c |
| The Arrhenius Equation | Nelcal | £24.50 | B,Econet | Sec | c |
| The Periodic Table | BBC | £23 | B | Sec | c |
| The Zantmann Experiment | Nelcal | £24.50 | B,Econet | Sec | c |
| Titrations | SYSTEM | £14.95 | B,Econet | Sec | c |
| Titrations | Arnold Wheaton | £16.10 | B | Sec | c |
| Titration Package | Cloud 9 | £8.50 | B | Sec | c |
| Water Treatment | Longman | £17.83 | B | Sec | c |
| What happens when the oil runs out? | Modular | £37.50 | B | Sec | c,g |
| What is a star | Modular | £37.50 | B | Sec | c,p,z |
| What caused the Whitside Downs Disaster? | Modular | £37.50 | B | Sec | c,s |
| Which Salt | Micro Power | £6.95 | B,Electron | Sec | c |
| Which Compound | Cloud 9 | £8.50 | B | Sec | c |
| **ECONOMICS/BUSINESS** | | | | | |
| Accounts 1 & 2 | Heinemann | £20.12 | B | Sec | d |
| Airline | Cases | £6.95 | B | J/S | d,s |
| Balance of Payments | Longman | £20.13 | B | Sec | d |
| Basic Macroeconomic Models | Longman | £28.75 | B | Sec | d |
| Break Even | Longman | £20.13 | b | Sec | d |
| Business games | Acornsoft | £9.95 | A,B,Electron | Sec | d |
| Cash Book | Pitman | £22.94 | B | Sec | d |
| Circular Flow of Income | Longman | £20.13 | B | Sec | d |
| Discounted Cash Flow | Social Science | £15 | B | Sec | d |
| Domestic Heating | Longman | £20.13 | B,Econet | Sec | d |

# 423 × 8 = £165*



## An electronic solution to your cabling and interfacing problems.

The 8-way RS423 "*Comptons SOFT SWITCH*", developed at the National Physical Laboratory, is now available from:-

THE SOFT OPTION

The Soft Option Ltd.
Imperial House
Lower Teddington Road
Hampton Wick KT1 4EP
Tel: 01-977 7670
Telex: 928017

**Trade enquiries welcome.**

*** Price excluding VAT and delivery.**

# Superdraft

**A 2-D draughting system on BBC/ Torch designed *specifically* for professional engineering drawing.**

Superdraft is *not* a general drawing package – it has the technical features you need to produce engineering drawings for any discipline. Here are some of Superdraft's facilities:

- Simple keyboard operation, or use optional digitiser.
- Full, dash, chain and arrowed lines/arcs.
- Drawings of 38 graphics and 26 text layers, all in mode Ø. Layers may be individually hidden, erased, stored and moved between drawings.
- Unrestricted zoom, scale, translate, rotate and reflect commands.
- Precision movement/measurement (six significant figures) in rectangular/polar co-ordinates or preset steps.
- Automatic 'snapping' to points, lines, arcs, symbols, intersections of line-line/line-arc/arc-arc.
- Automatic drawing of parallel, perpendicular and radial lines, and tangents between point-arc/arc-arc.
- Superb automatic dimensioning to ISO standards. This feature is superior to any on the BBC, and must be seen to be appreciated.
- Text at *any* angle and size.
- Automatic cross-hatching, any pitch and line type.
- Automatic arc blending (fillet arcs), with selectable radius, at intersections of line-line/line-arc/arc-arc.
- Predefined and user-defined symbol libraries. Symbols may be scaled and rotated or automatically fitted (even at an angle).
- Output to colour plotter with automatic scaling to paper size if required. Pen colours/thicknesses individually selectable.
- Calculation of area, perimeter, moments, centre of gravity and principal axes of a section.

Superdraft runs on BBC with Z80 second processor, and Torch computers. We can supply complete systems, including hard-disc and network.

Superdraft is in use now in industry, training and education. *It can handle the technical drawings that other systems can't — try us!*

**Latest developments:** Superdraft now uses the Acorn 'GXR' Graphics ROM for faster screen drawing. Also, falling hardware prices mean our system prices have just been reduced.

**Special Package for Schools:** by popular demand at the 'Computers and High-Technology in Education' exhibition, we now have a special Superdraft system for schools, needing only a single disc-drive. Only £350 for a one-location license.

We believe a demonstration will convince you of Superdraft's abilities – ring us now to arrange one. Demonstration discs also available.

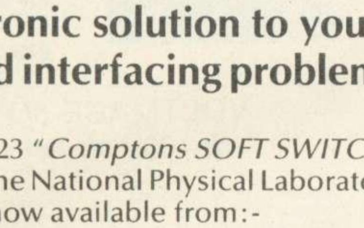
peak SYSTEMS DESIGN LTD. 1 Orgreave Way, Handsworth, Sheffield S13 9LS Tel: (0742) 696863

# 64K Non-volatile RAM Module

Probably the most versatile memory expansion for the BBC

'A gem ....... the ultimate in media portability.' (THE MICRO USER January 1986)

'Very useful' (A&B Dec. 86)



- Portable Silicon Disk
- NLQ Typesetting
- Printer Buffer
- Fast Data Storage

...... all this and much, much

**MORE!**

## THE INSIDE STORY




** ELECTRON VERSION AVAILABLE SOON **

# NEW HARDWARE LAUNCH!!

## PMS Z-range of Non-volatile RAM Disks for the ACORN Z80 SECOND PROCESSOR

All **EIGHT** RAM Disks in the Z-range, from the **PMS Z-64** offering 64K to the **PMS Z-512** with **HALF A MEGABYTE**, can be configured as **CP/M DRIVE A or B.** CP/M utilities, languages and programs require **NO MODIFICATION** to run on the Z-range RAM Disks.

PMS will supply the size of RAM Disk that best fits your needs. All units can easily be up-graded in units of 64K.

**RING PMS NOW (24hr) FOR DETAILS!**

## SPECIAL OFFER
## ** £15 OFF **
## PMS RAM Modules

| Description | Price excl. VAT |
|---|---|
| 64K RAM Module (RRP £129.95) | 114.95 |
| Power Splitter | 3.90 |
| Carry Case | 3.45 |
| Post & Packing | 2.00 |

PMS

# PERMANENT MEMORY SYSTEMS

38 MOUNT CAMERON DRIVE, ST LEONARDS, EAST KILBRIDE G74 2ES

**PHONE (03552) 32796**

BW/GC

59 WEST STREET
FAREHAM,
HANTS. PO16 0AW
(0329) 230671

# Electronequip

36-38 WEST STREET
FAREHAM,
HANTS. PO16 0JW
(0329) 230670

**(Authorised BBC Micro Dealer, and Econet service centre)**

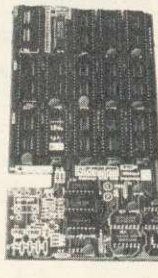
BRITISH BROADCASTING CORPORATION
MASTER SERIES MICROCOMPUTER

Acorn
The choice of experience.

| | |
|---|---|
| MASTER 128 (AMB15) | 499.00 |
| MASTER ET (ADB12) | 399.00 |
| MASTER Turbo upgrade (ADC06) | 125.00 |
| Econet Module (ADF10) | 49.99 |
| MASTER 512 upgrade (ADC08) | TBA |
| MASTER Sc upgrade (ADC03) | TBA |

**SIDEWISE**

ATPL



**SIDEWISE FITTED**



ATPL

"SIDEWAYS" rom board
for BBC Micro.
No soldering required
**£39.33** inc VAT

## PRINTERS

## TAXAN KP810

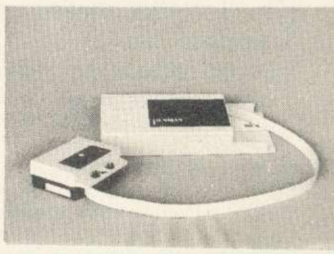



| | | |
|---|---|---|
| M1009 | (Brother) | **169.00** |
| HR15 | (Brother) | **359.10** |
| DMP2000 | (Amstrad) | **159.95** |
| RX100 | (Epson) | **419.00** |
| FX85 | (Epson) | **360.00** |
| FX100 | (Epson) | **524.00** |
| KP810 | (Kaga) | **230.00** |
| KP910 | (Kaga) | **429.00** |
| 6100 | (Juki) | **399.00** |

Printer price **includes** paper and BBC interface cable.
Screen dump Rom available for **£11.50** inc VAT

## VOLTMACE JOYSTICKS
***10% off list prices**

| | Discounted price inc VAT |
|---|---|
| Voltmace Delta 14B Joysticks | 13.46 |
| Voltmace 14B/1 Adaptor Box | 13.36 |
| Voltmace Delta 3B Twin Joysticks | 17.99 |
| Voltmace Delta 3B Single Joysticks | 11.95 |



3 COLOUR PLOTTER
with
utilities **£299.50**



AMX MOUSE
**89.99**

AKHTER Disc Drives **100% BBC COMPATIBLE**

HIGH QUALITY, HALF-HEIGHT DISK DRIVES

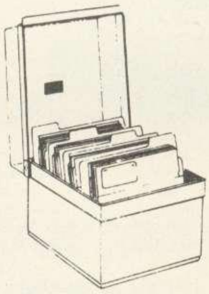
| | |
|---|---|
| MD 802D DUAL 800K 40/80 (inc PSU) | **£324.95** inc |
| MD 802C DUAL 800K 40/80 (No PSU) | **£244.95** inc |
| MD 400A SINGLE 400K 40/80 (No PSU) | **£124.95** inc |
| MD 400B SINGLE 400K 40/80 (inc PSU) | **£154.95** inc |

**Discs & Accessories**

| | |
|---|---|
| 1 Box DS/DD 96 TPI | **£19.95** inc |
| 1 Box SS/SD 48 TPI | **£16.95** inc |
| 5¼" Disk cleaning kit | **£5.99** inc |

**BBC MICRO SPARES**

| | | | | | |
|---|---|---|---|---|---|
| KEYBOARD | **50.24** | KEYSTRIP | **1.99** | SPEAKER | **2.99** |
| POWER SUPPLY | **56.35** | CASE | **19.99** | KEYSWITCH | **2.30** |



**EPROMS**
2764 ....... 2.49
27128 ..... 3.85

**DUST COVERS**

| | |
|---|---|
| RX80 F/T | 5.24 |
| FX80 | 5.29 |
| KP810 | 4.60 |
| BBC Micro | 4.14 |
| Microvitec | 6.10 |
| PW 1080A | 4.60 |

**DISC BOXES**
30 Disc Box..... 6.90
40 Disc Box... 13.80

**40/80 TRACK DRIVE SWITCH**

Plugs into disc interface, converts most 80 track drives into 40/80 track units. No more disc errors for wrong discs.
Introductory price ........................... **19.95** inc VAT

*Phone for comprehensive catalogue*

| | | | | | |
|---|---|---|---|---|---|
| Disc CMOS/TTL Chips | 5.49 | DNFS Rom | 20.60 | Sleuth | 32.00 |
| Acorn 8271 Disc Interface | 69.00 | Exmon II | 32.00 | Spellcheck III | 36.00 |
| Acorn 1770 Disc Interface | 49.00 | Graphics Rom | 32.20 | Toolkit Plus | 39.00 |
| Caretaker | 32.20 | Gremlin Rom | 32.20 | View Rom | 59.80 |
| Communicator | 67.85 | Help Rom II | 31.00 | View Sheet | 59.80 |
| Termi | 32.20 | Printmaster | 32.20 | Wordwise Plus | 56.35 |
| Disc Doctor | 32.20 | Screen Dump Rom | 11.50 | Plus many others | |

**ALL PRICES INCLUSIVE OF VAT**

Prices subject to variation without prior notification

**BRANCHES**
**MAIL ORDER: 36-38 WEST STREET**
**FAREHAM, HANTS (0329) 230670**
**SHOP/TECHNICAL: 59 WEST STREET**
**FAREHAM, HANTS (0329) 230671**
**17 TENNYSON AVE, KING'S LYNN**
**NORFOLK (0553) 773782**

VISA

## Electronequip

All Offers subject to availability
TRADE, EDUCATIONAL & HMG ORDERS
(Phone for discounts)
Large Stocks – 24 Hour Despatch
Securior £6.00 (per parcel) inc VAT.
Postage 62p (per item) inc VAT.

AA166

**36-38 West Street, Fareham, Hants (0329) 230670**

# EDUCATION

| TITLE | PUBLISHER | PRICE | MACHINE | AGE | TYPE |
|---|---|---|---|---|---|
| Economics "A" | Akadamias | £9.95 | B,Econet | Sec | d |
| Economics | Sigma | £25 | B | Sec | d |
| Economics | Longman | £14.50 | B | Sec | d |
| Egg Production | Crystal | £25 | B | J/S | d,s |
| Election Programme | Social Science | £39.50 | B | Sec | d |
| Energy Crisis | Social Science | £15 | B | Sec | d |
| Equi-marginal Utility | Longman | £20.13 | B | Sec | d |
| Estate agent | Longman | £14.50 | B | Sec | d |
| Farmer | Longman | £14.50 | B | Sec | d,s |
| Fixed Exchange Rates | Longman | £14.50 | B | Sec | d |
| Food and Population | BBC | £23 | B | Sec | d |
| Forecast | Acornsoft | £11.90 | B | Sec | d |
| Forecaster | Collins | £19.95 | B | Sec | d |
| GB Ltd | Simon Hessel | £5.13 | B | Sec | d |
| Heating Costs | BBC | £10 | B | Sec | d |
| Hot Cakes | Private Tutor | £7.95 | B,Electron | Sec | d |
| Hotel | Pitmansoft | £22.94 | B | Sec | d,s |
| Inkosi | Chalksoft | £6.95 | B | Ju | d |
| Intervention | SYSTEM | £115 | B,Econet | Sec | d,s |
| Introduction to Microeconomics | Pitmansoft | £57.44 | B | Sec | d |
| Introduction to Economics | University Software | £40 | B,Electron | Sec | d |
| Iron and Steel Locations | Longman | £20.13 | B | Sec | d |
| Living on a Low Budget | Ed Tech | £24.95 | B | Sec | d |
| Macroeconomic Database | Longman | £45.94 | B | Sec | d,dd |
| Making Ends Meet | Cambridge Micro | £16.50 | B,Econet | Sec | d |
| Malthus | Longman | £20.13 | B,Econet | Sec | d |
| Measuring Price Electricity | Longman | £14.50 | B | Sec | d,s |
| Merger | Longman | £14.50 | B | Sec | d |
| Mini Office | Database | £5.95 | B | Sec | d |
| Payslip | Pitman | £45.94 | B | Sec | d |
| Point of Sale | Heinemann | £48 | B | Sec | d |
| Population | CET | £13.95 | B | Sec | d |
| Population Growth | Cambridge Micro | £15.95 | B,Econet | Sec | d |
| Poverty and Income in Britain | Longman | £46 | B | Sec | d,nn |
| Price Discrimination | Longman | £20.13 | B | Sec | d,s |
| Riding School | Ginn & Co | £34.50 | B | J/S | d,s |
| Road User Insurance | Notts County Council | £11 | B | J/S | d,s |
| Running the British Economy | Longman | £34.44 | B | Sec | d |
| Sideline | Private Tutor | £7.95 | B,Electron | Sec | d |
| Stock | Arnold Wheaton | £16.10 | B | Sec | d |
| Teddytronics | Longman | £20.13 | B | Sec | d |
| Tick Tack | Primrose | £150 | B | Sec | d |
| Transpots | Longman | £28.75 | B,Econet | Sec | d,m |
| Understanding Economics | Longman | £45.94 | B | Sec | d |
| Unisim | Unilever | £35 | B | Sec | d |
| Workers and Machines | Longman | £20.13 | B | Sec | d |
| Yes Chancellor | Chalksoft | £17.50 | B | Sec | d |
| **ENGLISH** | | | | | |
| Adventure Text (Walsall Adventure Board needed) | RESOURCE | £8.95 | B | Special | e |
| Adventurous English | Highlight | £5.95 | B | J/S | e |
| Adventure Storywriter | ESM | £11 | B | Ju | e |
| Anagram | Ed Soft | £4.95 | A,B,B+ | I/J | e |
| Animal Vegetable Mineral | Arnold Wheaton | £9.95 | B | J/S | e |
| Antony and Cleopatra | Akadamias | £9.95 | B,Econet | Sec | e |
| Audio | SESS | £8 | B | Special | e |
| Back Home | Wida | £31.63 | B,Econet | I/J | e |
| Branching Story | Macmillan | £17.25 | B | Sec | e |
| C Rules | Ed Soft | £5.95 | A,B,B+ | Inf | e |
| Call my Bluff | Macmillan | £17.25 | B | Sec | e |
| Call Your Bluff | Square | £7 | B | Inf | e,m |
| Castle and Clowns | Macmillan | £7.99 | B | Inf | e |
| Chaucer Prologue | Akadamias | £9.95 | B,Econet | Sec | e |
| Children from Space | ASK | £9.95 | B,Electron | Ju | e,v |
| Cleverclogs | Computertutor | £6.50 | B | Ju | e,q |
| Clown | Englefield | £6.25 | B | Ju | e,v |
| Cloze | Wida | £28.75 | B,Econet | Teacher | e,jj |
| Communication | Britannica | £75 | B | J/S | e,ee |
| Crossed Words | Aztec | £6.50 | B,B+ | I/J | e |
| Dictionary | Daco | £13 | B | Ju | e |
| Dictionary | Highlight | £9.95 | B | I/J | e |
| Ding Dong | Nisbet | £8.05 | B | I/J | e |
| Early English Extra | Nisbet | £12.59 | B | I/J | e |
| Early Reading | ESM | £11.95 | B | I/J | e |
| Early Language | SESS | £8 | B | Special | e |
| Easywrite | SYSTEM | £10 | B | J/S | e |
| Educational 1&2 | Golem | £6.95 | B,Electron | I/J | e,m |
| English Language Assessment Pack | In Service Systems | £45 | B | EFL | e |
| Englishskills | Griffin | £11.95 | B | Sec | e |
| English Literature | Akadamias | £9.95 | B | Sec | e |
| Entertaining English | Highlight | £11.95 | B | Ju | e |
| File Maker | Kingfisher | £7.50 | B | I/J | e |
| Flowers of Crystal | 4mation | £16 | B,B+ | Ju | e,s |
| Fol de rol | Sulis | £9.95 | B | I/J | e,q |
| Fun with Words | Golem | £6.95 | B,Electron | I/J | e |
| Gerard Manley Hopkins | Akadamias | £9.95 | B,Econet | Sec | e |
| Gobbledegook | Chalksoft | £9.25 | B | Sec | e |
| Going Places | Widgit | £40.25 | B | Special | e,m |
| Grammar Tree | Sulis | £10.95 | B | Sec | e |
| Granny's Garden | 4mation | £13.80 | B,B+ | Ju | e |
| Hamlet | Akadamias | £9.95 | B,Econet | Sec | e |
| Hangman | Micro-aid | £7.95 | B | I/J | e |
| Hangman Player | Square | £7 | B | Ju | e |
| Henry IV Part 1 | Akadamias | £9.95 | B,Econet | Sec | e |
| Initial Consonants | Drake | £8 | B | I/J | e |
| Joint Matriculation Board Poems | Akadamias | £9.95 | B,Econet | Sec | e |
| Jumbles | Bryants | £5.10 | B,B+ | Ju | e |
| Junior Hangman | Square | £7 | B | Ju | e |
| Junior Word Splits | Sulis | £9.95 | B | Ju | e |
| Language Development | LTS | £12.95 | B,B+,Econet | J/S | e |
| Laser Letters | Shards | £6.95 | B | I/J | e |
| Letra | MUSE | £12 | B | J/S | e |
| Lingo | Complete | £12.95 | B | J/S | e |
| Look it Up | GED | £4.50 | B | Ju | e |
| Mallory | MUSE | £4.50 | B | J/S | e |
| Mansfield Park | Akadamias | £9.95 | B,Econet | Sec | e |
| Masterbard | Sulis | £12.95 | B | Sec | e |
| Mastercab | Byants | £5.10 | B | Ju | e,q |
| Meaning Maker 1-4 | Monitor | £10 | B | Inf | e |
| Medlibs | Contex | £9.50 | B | J/S | e |
| Micro Stories | Wida | £23 | B,Econet | I/J | e |
| Micro Verse | Wida | £23 | B,Econet | I/J | e |
| Micro English | LCL | £24.50 | B,B+,Electron | Sec | e |
| Microstory | ESM | £11 | B | Ju | e |
| Nouns | Sulis | £7.35 | B | Sec | e |
| Open Sesame | Sulis | £9.95 | B | I/J | e |
| oze | AUCBE | £13.80 | B | J/S | e |
| Picture Spell | GED | £5 | B | I/J | e |
| Play with Words | Pee Bee | £8.50 | A,B | Ju | e |
| Podd | ASK | £9.95 | B,Electron | I/J | e,v |
| Police – Language in Evidence | Cambs Software | £20 | B | J/S | e |
| Puncman 1,2,3&4 | Chalksoft | £9.25 | B,Eletron | Ju | e |
| Punctuation 1&2 | Bryants | £5.10 | B,B+ | J/S | e |
| Rape of the Lock and The Epistle to Arbuthnot | Akadamias | £9.95 | B | Sec | e |
| Readamatics | Longman | £28.75 | B | Sec | e |
| Scenes Suite | Page | £15 | B | Inf | e |
| Sentence Builder | ESM | £14.89 | B | I/J | e |
| Sentence Sequencer | Acornsoft | £15.35 | B,Electron | Ju | e |
| Sentence Shaker | GED | £4.50 | A,B | Ju | e |
| Sentence Starter | Educated Owl | £9.50 | A,B | Ju | e |
| Sentence Construction | SESS | £8 | B | Special | e |
| Sentence Construction | Darwood | £4.95 | A,B | Ju | e |
| Sentences | Sulis | £7.35 | B | Sec | e |
| Sentence Maker | Educational Software | £23 | B | I/J | e |
| Sequence | Solent | £8 | B | I/J | e |
| Shipwrecked | Logical | £7.50 | B | Ju | e |
| Similes | AVC | £3 | A,B | J/S | e |
| Sixgam | Pitman | £29.84 | B | Sec | e |
| Snapple Hopper | Macmillan | £7.99 | B | Inf | e |
| Speechparts | Bryants | £5.10 | B,B+ | Sec | e |
| Speedread English | Wida | £22.43 | B,Econet | Sec | e |
| Spell | SESS | £8 | B | Special | e |
| Spellbound | Sulis | £9.95 | B | I/J | e |
| Spellcheck | Ed Soft | £4.95 | A,B,B+ | J/S | e |
| Spelling | Soft Centre | £6.90 | A,B | J/S | e |
| Spelltest | Bryants | £5.10 | B,B+ | J/S | e,q |
| Stable | Englefield | £6.25 | B | Ju | e |
| Starspell | MUSE | £8 | A,B,B+ | J/S | e |
| Story | Daco | £14.50 | B | Ju | e |
| Story | H&H | £7.50 | B | Inf | e |
| Story | Chalksoft | £7.95 | B | Ju | e |
| Storybuilder | Bryants | £5.10 | B,B+ | Ju | e |
| Storyline | Daco | £7.95 | B | Ju | e |
| Storywriter | ESM | £12.65 | B | Ju | e |
| Stspell B | MUSE | £9 | B,B+ | Sec | e |
| Superspell | Aztec | £5.50 | B,B+ | Ju | e |
| Talkback | Acornsoft | £9.95 | B | J/S | e |
| Telebook | 4mation | £20.30 | B,B+ | Ju | e,aa |
| Terrible Tales | Longman | £12.59 | B | Ju | e |
| Text | MUSE | £8 | B,B+ | Sec | e |
| The Circus | Sherston | £13.80 | B | Inf | e,m |
| The Establishment | Logical | £7.50 | B | Ju | e |
| The Garden | Clares | £6.95 | B,B+ | I/J | e |
| The Tempest | Akadamias | £9.59 | B,Econet | Sec | e |
| The Trumpet Major | Akadamias | £9.95 | B,Econet | Sec | e |
| Top and Tails | Macmillan | £7.99 | B | Inf | e |
| Town | Cambs Software | £10 | B | I/J | e |
| Watching the Street | Gibsoft | £4.65 | B | Ju | e |
| Where/We're, Wear/There, They're/Their | Primary Programs | £5.95 | B | J/S | e |
| Wilde – The Importance of Being Earnest | Akadamias | £9.95 | B,Econet | Sec | e |
| Wilt | Longman | £12.59 | B | Sec | e |
| Wonderwords | Tom Shipman | £7.99 | B | Ju | e |
| Word Hunt | Acornsoft | £15.35 | B,Electron | J/S | e |
| Word Sequencing | Acornsoft | £15.35 | B,Electron | Ju | e |
| Word Skill | Chalksoft | £14.25 | B | J/S | e |
| Word Tray Wizard | Hill MacGibbon | £6.95 | B | J/S | e |
| Wordchaser | Tom Shipman | £7.99 | B,Electron | Ju | e |
| Wordflash | Ed Soft | £4.95 | A,B,B+ | I/J | e |
| Wordfrog | Educated Owl | £7.50 | B | Ju | e |
| Wordgames | Griffin | £9.95 | B | Ju | e |
| Wordhang | BES | £8.97 | B,B+,Electron | I/J | e |
| Wordline | Aztec | £3 | B,B+ | Ju | e |
| Wordmaster | RH Electronics | £9.95 | B | J/S | e |
| Wordpower | Sulis | £9.95 | B | J/S | e |
| Words and Pictures | Chalksoft | £11.25 | B | Ju | e |
| Words words words | ASK | £9.95 | B,Electron | Ju | e |
| Wordspell | Griffin | £9.95 | B | Ju | e |
| Wordsquares | MUSE | £6 | B,B+ | J/S | e |
| **GEOGRAPHY/GEOLOGY** | | | | | |
| Bearings | Bryants | £5.10 | B,B+ | Sec | g |
| Britain | Datapen | £5.95 | B | Sec | g,q |

# EDUCATION

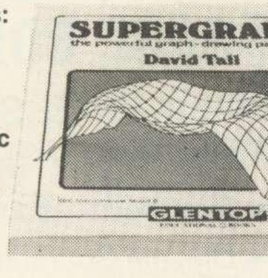
| TITLE | PUBLISHER | PRICE | MACHINE | AGE | TYPE |
|---|---|---|---|---|---|
| British Cities | Schoolsoft | £8 | B | J/S | g,q |
| Capitals | Square | £7 | B | J/S | g,q |
| Cargo | Macmillan | £6.95 | B | J/S | g,s |
| Cellmap | Earth Science | £12.95 | B | Sec | g,u |
| Clifton College Satellite Project | Clifton College | | B | J/S | g,i |
| Climate | Heinemann | £20.12 | B | Sec | g,cc |
| Climate | CET | £14.38 | B | Sec | g |
| Climates | Longman | £23 | B | Sec | g |
| Contour Maps and Cross Sections | Longman | £20.13 | B | Sec | g |
| Contours/Places | Primary Programs | £5.95 | B | J/S | g |
| Coucapcur | Ed Soft | £4.95 | A,B,B+ | Ju | g,q |
| Counties | Bryants | £5.10 | B,B+ | J/S | g |
| Countries | Hewson | £7.95 | B | Sec | g |
| Developing Cities | Nelcal | £30.48 | B,Econet | Sec | g |
| Drainage Basin Morphometry | Longman | £20.13 | B | Sec | g |
| Europe | Himap | £6.50 | B,Electron | J/S | g |
| Europe | Paean Systems | £6.50 | B | Sec | g |
| Europe Rally | Tom Shipman | £7.99 | B,Electron | J/S | g,q |
| European Knowledge | Micro Power | £6.95 | B,Electron | Sec | g |
| European Studies | Aztec | £6.50 | B,B+ | Sec | g,q |
| Food, Farming and Famine | Nelcal | £24.50 | B | Sec | g,d |
| GB Geography | Primasoft | £6.95 | B | J/S | g |
| Geochemical Simulation | Earth Science | £13.95 | B | Sec | g,c |
| Geography/Environmental Studies | Scisoft | £6.95 | B | J/S | g,ii |
| Geodata | Earth Science | | B | Sec | g |
| Geography | Corona | £5 | B | Sec | g |
| Geography | Tutorial | £11.95 | B,Electron | Sec | g |
| Geography 'A' | BBC | £11 | B | U/S | g |
| Geography | Garland | £10 | B | Sec | g |
| Geography | School | £12.95 | B,Econet | Sec | g |
| Geographer's Tool Kit | Earth Science | £14.95 | B | Sec | g |
| Geomorphology | Earth Science | £15 | B | Sec | g |
| Glaciers | Himap | £9.50 | B | Sec | g |
| Gridrefs | Himap | £6 | B,Electron | J/S | g |
| Grids and Maps | Earth Science | £13.95 | B | Sec | g |
| Hatfield Geography | Longman | £28.75 | B,Econet | Sec | g |
| Hills | Longman | £14.50 | B | Sec | g |
| Identify Europe | Kosmos | £7.95 | B | Sec | g |
| Introducing Map Skills | Cambridge Micro | £15.95 | B,Econet | J/S | g |
| Introducing Geography | BBC | £20 | B | J/S | g |
| Italy | Corona | £5 | A,B | J/S | g |
| Let's Explore London/Paris | Cambs Software | £10 | B | J/S | g |
| Linmap | Linear Graphics | £22.42 | B | Sec | g,gg |
| Locate an Oil Rig | Nelcal | £24.50 | B | Sec | g |
| Locate an Indusry | Nelcal | £24.50 | B | Sec | g |
| Map Rally | BES | £8.97 | B,B+,Electron | Ju | g |
| Map References | Logical | £7.50 | B | J/S | g |
| Map Skills | CET | £13.95 | B | Sec | g |
| Mapfax | S&S | £19.49 | B | Ju | g |
| Maps and Landscapes 1 | Chalksoft | £17.50 | B | Sec | g |
| Meandering Mississippi | Earth Science | £13.95 | B | Sec | g |
| Met Maps | Garland | £13.51 | B | Sec | g,gg |
| Micro Map 1 & 2 | Longman | £44.85 | B | J/S | g |
| Micro Mapping | Nelcal | £22.42 | B | Ju | g |
| Motorway Route | Longman | £20.13 | B,Econet | Sec | g |
| Oilstrike | Macmillan | £6.95 | B | J/S | g |
| Ordnance Survey | Himap | £8 | B | J/S | g |
| OS Quiz | Arnold Wheaton | £6 | B | Sec | g |
| Patterns of Underdevelopment | Nelcal | £30.48 | B,Econet | Sec | g,d |
| Peak District | RESOURCE | £9.95 | B | Sec | g |
| Pirate | Chalksoft | £9.25 | B | Ju | g |
| Plate Tectonics | Earth Science | £13.95 | B | Sec | g |
| Predicting Journey Patterns | Longman | £20.13 | B | Sec | g |
| Prospecting Game | Longman | £20.13 | B | Sec | g |
| Rice | Longman | £20.13 | B,Econet | Sec | g,d |
| Quake! | Earth Science | £12 | B | Sec | g |
| Quakes | Solent | £9 | B | Sec | g |
| Rail | Longman | £22 | B | Sec | g |
| River Water Control | Longman | £20.13 | B | Sec | g |
| Rock Soft | Earth Science | £17.95 | B | Sec | g |
| Round the World | Ginn | £34.50 | B | Ju | g |
| Sea Cliff Erosion | Cambridge Micro | £16.50 | B,Econet | Sec | g |
| Sea Wall Defences | Longman | £20.13 | B | Sec | g |
| Secondary Geography | Hutchinson | £24 | B | Sec | g |
| Serpent's Lair | Comsoft | £4.95 | B,Electron | J/S | g |
| Silicate Materials | Earth Science | £13.95 | B | Sec | g,c |
| South Eastern Railway Game | Longman | £20.13 | B,B+ | Sec | g |
| Spurn Head | Earth Science | £13.95 | B | Sec | g |
| Topomap | Earth Science | £25 | B | Sec | g |
| Tourism | Nelcal | £30.48 | B,Econet | Sec | g |
| Towns of Great Britain | Aztec | £6.50 | B | J/S | g |
| Towntest | Silverlind | £6.50 | B | Sec | g,q |
| Travel | Heinemann | £33 | B | Ju | g |
| Urban Geography Pack | Longman | £40.25 | B | Sec | g |
| Water on Land | Longman | £20.13 | B,Econet | Sec | g,s |
| Weather | Heinemann | £33 | B | Ju | g |
| Weather Station | Arnold Wheaton | £9.95 | B | Sec | g |
| Weather Forecasting | Longman | £23 | B | Sec | g |
| Weather Chart | Paean | £9.50 | B | Sec | g |
| Weather Ship Oscar | Earth Science | £13.95 | B | Sec | g |
| Weathermaster | Macmillan | £6.95 | B | J/S | g |
| Where? | Micro Power | £6.95 | B,Electron | J/S | g,q |
| Wildcat! | Earth Science | £13.95 | B | Sec | g |
| Windmill Game | Longman | £20.13 | B,Econet | Sec | g |
| Winds | Longman | £14.50 | B,Econet | Sec | g |
| World Geography | MicroPower | £6.95 | B | J/S | g,q |
| World Map | Himap | £6.50 | B,Electron | J/S | g |
| Worldwise | BES | £8.97 | B | J/S | g |

| TITLE | PUBLISHER | PRICE | MACHINE | AGE | TYPE |
|---|---|---|---|---|---|
| **HISTORY** | | | | | |
| 1914 | Cambridge Micro | £15 | B,Econet | Sec | h,s |
| American West | Longman | £20.13 | B | Sec | h |
| Archaeology | Cambs Software | £13 | B | Sec | h |
| Attack on the Somme | Tressell | £13.99 | B | Sec | h,s |
| British History 1714-1815 | Akadamias | £9.95 | B,Econet | Sec | h |
| Campaign | Longman | £20.13 | B | Sec | h,s |
| Canal Building | Longman | £20.13 | B | Sec | h |
| Castle Pack | RESOURCE | £15.95 | B | J/S | h |
| Dinosaurs | Cambs Software | £16 | B | Inf | h |
| Disraeli | Longman | £20.13 | B | Sec | h |
| Eighteenth Century Europe | Akadamias | £9.95 | B,Econet | Sec | h |
| England in the Age of Total War | Akadamias | £9.95 | B,Econet | Sec | h |
| Europe 1870-1950 | Akadamias | £9.95 | B,Econet | Sec | h |
| Europe 1789-1870 | Akadamias | £9.95 | B,Econet | Sec | h |
| Europe in the Seventeenth Century | Akademias | £9.95 | B,Econet | Sec | h |
| Fletcher's Castle | Fernleaf | £9.95 | B | Ju | h,s |
| History Revision | Abacus | £12.95 | B | Sec | h |
| History Quiz | Acornsoft | £12.65 | B,B+ | Sec | h,q |
| How We Used To Live 1902-1926 and 1926-1953 | Fernleaf | £30 | B | J/S | h |
| Mary Rose | Ginn & Co | £32.50 | B | J/S | h,s |
| Micro-History | Hodder | £6.90 | B | Sec | h |
| Murder | Longman | £20.13 | B | Sec | h |
| Nineteenth Century England | Akadamias | £9.95 | B,Econet | Sec | h |
| Norman England | Fernleaf | £31.26 | B | J/S | h,s |
| Palestine 1947 | Longman | £20.13 | B | Sec | h |
| Railway Drama | Fernleaf | £31.26 | B | J/S | h,s |
| Renaissance Europe | Akadamias | £9.95 | B,Econet | Sec | h |
| Shallow Hill | Longman | £20.13 | B | Sec | h |
| Sir Francis Drake Adventure Game | LCL | £6.50 | B,Electron | J/S | h,s |
| Stuart England | Akadamias | £9.95 | B,Econet | Sec | h |
| The Black Death | Longman | £28.75 | B | J/S | h |
| The French Revolution | Akadamias | £9.95 | VB,Econet | Sec | h |
| The Saxons | Garland | £13.23 | B | Ju | h |
| The Somme | Tressell | £8.50 | B | Sec | h,s |
| The Victorians | Fernleaf | £22.95 | B | J/S | h |
| Time Traveller | Sulis | £9.95 | B | J/S | h,q |
| Time Traveller's London | GSN | £28.75 | B | J/S | h,s |
| Tudor England | Akadamias | £9.95 | B,Econet | Sec | h |
| Viking England | Fernleaf | £31.26 | B | J/S | h,s |
| **MUSIC** | | | | | |
| Aural 5 | Longman | £20.13 | B | Sec | k |
| Beep-beep | IJK | £4.50 | B | I/J | k |
| Carousel | Schoolsoft | £5 | B | Ju | k |
| Envelope Generator | SYSTEM | £7 | B | Sec | k |
| Music | BBC | £10 | B | Sec | k |
| Music Editor | SYSTEM | £9 | B,B+ | Sec | k |
| Music Maestro | Promotional ArtWork | £12.50 | B | Sec | k |
| Music System | SYSTEM | £29.95 | B,Econet | Sec | k |
| Music | Garland | £9.96 | B | Sec | k |
| Music Maker | Fsoft | £10.35 | B | Sec | k |
| Music Theory | Longman | £28.75 | B | Sec | k |
| Music Box | Sherston | £10 | B | J/S | k |
| Musical Relationships | Primary Programs | £9.95 | B | Sec | k |
| Music Quiz | Acornsoft | £12.65 | B,B+,Electron | Sec | k,q |
| Note Invaders | Chalksoft | £14.25 | B,Electron | Ju | k |
| Passit Music Tutor | Ed Soft | £9.95 | A,B | Sec | k |
| Practise and Play | Arnold Wheaton | £22.84 | B | J/S | k |
| Reading Music Grade I | Ardsoft | £31 | B | J/S | k |
| Recorder Tutor | Mupados | £25 | B | J/S | k |
| Recorder Duet Pack | Mupados | £5.75 | B | J/S | k |
| Rhythm and Pitch | Chalksoft | £11.25 | B | Sec | k |
| Solfatu | MUSE | £9 | B,B+ | J/S | k |
| Synth | Musicsoft | £8.75 | B | Sec | k |
| The Ensemble Pack | Mupados | £7.50 | B | J/S | k |
| **LANGUAGES** | | | | | |
| A Vous la France | BBC | £15.50 | B,B+ | Sec | l |
| Ausweis: Mit dem Bus | Macmillan | £15 | B | Sec | l |
| Autoevaluacion | Wida | £28.75 | B,Econet | Sec | l |
| Bati-texte | Wida | £28.75 | B,Econet | Sec | l |
| Centre Ville | Chalksoft | £17.50 | B | Sec | l |
| Closemaster | Wida | £28.75 | B,Econet | Sec | l,aa |
| Comprenez | Heinemann | £20.12 | B | Sec | l,q |
| Das Schloss | Chalksoft | £9.25 | A,B | Sec | l,q |
| Deutsch Direkt | BBC | £19.95 | B | Sec | l |
| Didacticiel | Wida | £28.75 | B,Econet | Sec | l,jj |
| Die Prinzessin | Aztec | £6.50 | B,B+ | Sec | l,q |
| Ecce Romani | Longman | £20.13 | B | Sec | l |
| Eiffel Tower | Chalksoft | £9.25 | B,Electron | Sec | l,q |
| French | Acornsoft | £11.05 | B | Sec | l |
| French | Micro-aid | £7.95 | B | Sec | l |
| French | AVC | £3 | B,B+ | Ju | l |
| French Connections | Cambridge Micro | £16.74 | B,Econet | Sec | l |
| French Vocab | Hargreaves | £6.50 | B | J/S | l |
| French Mistress | Kosmos | £7.35 | B,B+,Electron | Sec | l |
| French Copywrite | ESM | £14.89 | B | Sec | l |
| French Verbs | Primary Programs | £9.95 | B | Sec | l |
| French 1&2 | Macmillan | £17.25 | B | Sec | l |
| French on the run | Silversoft | £9.95 | B | Sec | l,s |
| Gapkit European Languages | Wida | £23 | B,Econet | Sec | l |
| German Master | Kosmos | £7.35 | B,B+,Electron | Sec | l |
| German | Macmillan | £17.25 | B | Sec | l |
| German | Acornsoft | £11.05 | B | Sec | l |

# SUPERGRAPH
## £28.75

The standard facilities are suitable for young children meeting graphs and co-ordinates for the first time, while the more sophisticated aspects are appropriate for Advanced through to University level.

**The disc includes:**
***Supergraph**
***Superzoom**
***Superprint**
***Demonstration**
**Supplied on 1 disc (40 or 80T) with 144 page manual.**




# GRAPHIC CALCULUS
## I, II & III

The three **GRAPHIC CALCULUS** packages, covering Differentiation, Integration and Differential Equations, are a significant step forward in teaching the fundamentals of the calculus. Using moving pictures to illustrate dynamic processes, the programs surpass anything that can be illustrated by static drawings in a book.

**PRICE: £28.75 each.**

# LOGO SCHOOLS PACK
## HONEY LOGO VERSION £28.50

Pack contains:
2 Pupils workbooks, 1 Teachers Notes, 21 Workcards, 1 Parents & Teachers Guide, Logo implementation (cassette or 40/80T disc).

## LOGOTRON VERSION £20.00

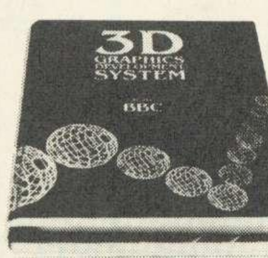
Pack contains:
3 Pupils workbooks, 1 Teachers Notes, 21 Workcards.
Class sets and Network version available.

# 3D GRAPHICS
## DEVELOPMENT SYSTEM £25.00

**Simply the most sophisticated 3D design and Animation System for the BBC micro.**

This flexible design tool allows 3D images to be incorporated into your own programs.

Supplied on 2 discs (40 or 80T) with 96 page manual




**GLENTOP**

PUBLISHERS □ LIMITED

STANDFAST HOUSE, BATH PLACE, HIGH STREET, BARNET, HERTS EN5 5XE TELEPHONE: 01-441 4130 TELEX: 22828

# BBC/ELECTRON EDUCATIONAL SOFTWARE

*Our educational software is used in thousands of schools and homes throughout Great Britain.*

**EDUCATIONAL 1** *BBC/ELECTRON* — *£6.95* Tape ~~£8.00~~ *£8.95* Disc ~~£10.00~~
Hours of fun and learning for children aged five to nine years. Animated graphics will encourage children to enjoy counting, maths, spelling and telling the time. The tape includes six programs: MATH 1, MATH 2, CUBECOUNT, SHAPES, SPELL and CLOCK.
*. . . 'An excellent mixture of games' . . . Personal Software – Autumn 1983.*

**EDUCATIONAL 2** *BBC/ELECTRON* — *£6.95* Tape ~~£8.00~~ *£8.95* Disc ~~£10.00~~
Although similar to Educational 1 this tape is more advanced and aimed at seven to twelve year olds. The tape includes MATH 1, MATH 2, AREA, MEMORY, CUBECOUNT and SPELL.

**FUN WITH NUMBERS** *BBC/ELECTRON* — *£6.95* Tape ~~£8.00~~ *£8.95* Disc ~~£10.00~~
These programs will teach and test basic counting, addition and subtraction skills for four to seven year olds. The tape includes COUNTING, ADDING, SUBTRACTION and an arcade type game called ROCKET MATHS which will exercise addition and subtraction. With sound and visual effects.
*. . . "These are excellent programs which teachers on the project have no hesitation in recommending to other teachers." . . . Computers in the Classroom Project, Riley High School.*

**FUN WITH WORDS** *BBC/ELECTRON* — *£6.95* Tape ~~£8.00~~ *£8.95* Disc ~~£10.00~~
Start your fun with alphabet puzzle, continue your play with VOWELS, learn the difference between THERE and THEIR, have games with SUFFIXES and reward yourself with a game of HANGMAN.
*. . . 'Very good indeed' . . . A&B Computing – Jan/Feb 1984*

**JIGSAW AND SLIDING PUZZLES** by P. Warner *BBC/ELECTRON* — *£6.95* Tape ~~£8.00~~ *£8.95* Disc ~~£10.00~~
There are two jigsaw and four sliding puzzles on a 3 × 3 and 4 × 4 grid. Each program starts off at an easy level to ensure initial success but gradually becomes harder. It helps children to develop spatial imagination and in solving problems. The tape includes: OBLONG, JIGSAW, HOUSE, NUMBERS, CLOWN and LETTERS.

**KON-TIKI** by J. Amos *BBC* — *£11.95* Disc ~~£12.95~~
Simulation program based on Thor Heyerdahl's KON-TIKI expedition. Enjoy a journey on the KON-TIKI recording on a map the raft's position and entering notes in the logbook on creatures found, unusual events etc. Inclusive of booklet, background information, maps and fully supportive illustrated data sheets.
*. . . "A well thought-out package with a wide appeal" . . . Which Micro & Software Review — October 1984.*

★★SPECIAL OFFER★★
***Buy three titles and deduct £4.00***
*Add 50p p&p per order. Please state BBC or ELECTRON or 40 or 80 track for discs.*

**Golem Ltd, Dept A, 77 Qualitas, Bracknell, Berks RG12 4QG. Tel: 0344 50720**

# Educational Software — LCL




**For BBC Micro (A, B, B+, B128), Electron** (Tapes, 40/80 track discs Econet compatible)
Commodore 64, ZX Spectrum, unexpanded Vic, ZX81, Apple, PET, Amstrad

**PASS GCE**

**IMMEDIATE DISPATCH**
Send coupon, or phone orders or requests for free colour catalogue to:
LCL (Dept A), 26 Avondale Ave, Staines, Middx. (Tel 0784 58771) (most hours).

**£5 off total for 2 courses, £10 off total for three.**

**MEGA MATHS** (BBC, Electron, Amstrad). 24 program step by step. A-level course of 105 topics for mature beginners, A-level students and Micro Maths users (2 discs/tapes & 2 books) £24.
**MICRO MATHS (NEW)** 24 program revision or self-tuition course taking beginners (from 8yrs) to O-level. Includes 59 topics on 2 discs/tapes plus two books (now has more colour graphics) £24 (upgrade £4).
**MICRO ENGLISH** (BBC, Electron, Amstrad). Complete English Language self-tuition and revision course, to O-level, of 24 programs. Includes "Speak-and-Spell" with real voice (no extras required). £24.
**BRAINTEASERS** Book of IQ tests and puzzle programs. £5.95 *"Excellent"*. EDUCATIONAL COMPUTING.

VISA **WORLD LEADERS IN COMPLETE SELF-TUITION COURSE SOFTWARE (IN 24 COUNTRIES)**

NAME ........................................ ADDRESS ..........................

..................................................................................

TITLE ........................ COMPUTER ........................ 40/80 Disc/tape

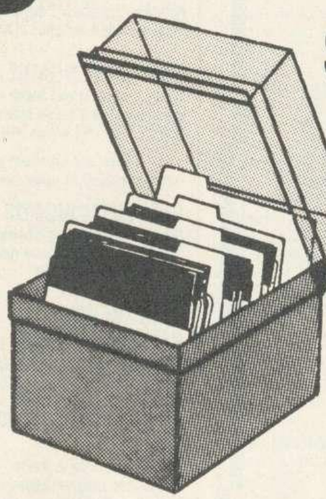
AA41

# IDS Computer Supplies

**NO-QUIBBLE GUARANTEE!**

**Terms:** We accept VISA, Access, Cash, Postal Orders, Cheques, etc. Telephone Orders accepted from Government bodies, schools etc. or with VISA or ACCESS card. Cheques payable to "IDS Computer Supplies". **Don't forget to add VAT**

## 50 DISKS PLUS SUPERB ABS PLASTIC STORAGE BOX WITH DIVIDERS AND SMOKED FLIP-TOP LID



SS/DD **£29.95***

NEW! DS/DD **£39.95***

DS/QD **£49.95***

- Full Specification
- Lifetime Guarantee!
- Bulk packed disks identical to branded product but without manufacturers label!
- Complete with labels and w/p tabs!
- Individually certified to 30% above ANSI Specification!

For SS/DD send cheque for £36.74, DS/DD £48.24, DS/QD £59.74 — Includes £2.00 Delivery and VAT

*excl. delivery and VAT

## Not enough room here – Call for Catalogue

## We can now offer our unbranded DISKS in a LIBRARY CASE From 79p

- Full Specification
- Full no quibble guarantee
- Hub Rings
- Supplied with sleeves, labels, etc.
- Made by well–known manufacturer

| Price per box 10* | | 1–4 | 5–9 | 10–24 | 25–49 |
|---|---|---|---|---|---|
| 5¼" | SS/DD 48tpi | 7.90 | 7.40 | 7.20 | 7.05 |
| | DS/DD 48tpi | 9.90 | 9.20 | 8.90 | 8.60 |
| | DS/QD 96tpi | 13.90 | 13.10 | 12.80 | 12.60 |
| 3½" | SS 135 tpi | 22.90 | 21.50 | 20.80 | 19.90 |
| | DS 135 tpi | 29.90 | 27.90 | 26.80 | 25.80 |

***Add 15% VAT Free Delivery**

## 3" DISKS £2.99

Full specification.
Double sided for use with single sided drives

| Price per box of 10* | 1-4 | 5-9 | 10-24 | 25-49 |
|---|---|---|---|---|
| | 29.90 | 28.90 | 27.90 | 26.90 |

Single Disks **£3.50** 5 Disks **£3.20** each

Allow 28 days for delivery

### STORAGE BOX

ABS plastic with smoked flip-top lid. Holds 12 cased, 18 uncased ........£6.95

***Add 15% VAT Free Delivery**

## StorageMaster

Full Specification Lifetime Guarantee

| Price per box 10* | | 1-4 | 5-9 | 10-24 |
|---|---|---|---|---|
| 5¼" | SS/DD 48tpi | 13.90 | 12.40 | 10.90 |
| | DS/DD 48tpi | 17.90 | 16.40 | 14.90 |
| | SS/QD 96tpi | 17.90 | 16.40 | 14.90 |
| | DS/QD 96tpi | 20.90 | 19.40 | 17.90 |
| | DS/HD 1.6Mb | 34.90 | 32.40 | 29.90 |
| 3½" | SS 135 tpi | 25.50 | 23.90 | 22.60 |
| | DS 135 tpi | 34.90 | 33.10 | 31.40 |

***Add 15% VAT Free Delivery**

## FUJI

Full Specification Lifetime Guarantee

| Price per box 10* | | 1-4 | 5-9 | 10-24 |
|---|---|---|---|---|
| 5¼" | SS/DD 48tpi | 17.90 | 16.40 | 14.90 |
| | DS/DD 48tpi | 20.90 | 19.40 | 17.90 |
| | DS/QD 96tpi | 24.90 | 23.40 | 21.90 |
| | DS/HD 1.6Mb | 38.90 | 36.40 | 33.90 |
| 3½" | SS 135 tpi | 29.90 | 28.40 | 26.90 |
| | DS 135 tpi | 39.90 | 37.90 | 35.90 |

***Add 15% VAT Free Delivery**

1. All prices, unless otherwise specified, include 2nd class delivery (UK Mainland), but exclude VAT. For urgent deliveries please telephone for delivery charges.
2. Telephone Orders can be accepted from Government bodies, schools, etc. or from private individuals or companies with VISA or ACCESS Card
3. Send cheques made payable to "IDS Computer Supplies" with the order to the address below.

**Don't forget the VAT.**

BARCLAYCARD VISA · Access

**IDS Computer Supplies**
**Dept S4**
**0908 569655**

**Unit 15 Darin Court ■ Crownhill ■ Milton Keynes ■ MK8 0AD**

# EDUCATION

| TITLE | PUBLISHER | PRICE | MACHINE | AGE | TYPE |
|---|---|---|---|---|---|
| German Sentence | Educated Owl | £9.50 | B | Sec | l |
| German Copywrite | ESM | £14.89 | B | Sec | l |
| German Routines | Wida | £17.25 | B,Econet | Sec | l |
| Granville | Cambridge Micro | £16.74 | B,Econet | Sec | l,s |
| Incendie a l'hotel | Wida | £20.13 | B,Econet | Sec | l |
| Irregular Verbs | Carsondale | £15.99 | B | Sec | l |
| Italian | Acornsoft | £11.05 | B | Sec | l |
| Jeu des Menages | Cambridge Micro | £17.80 | B,Econet | Sec | l |
| Just a Mot | Sulis | £9.95 | B | J/S | l |
| Kopjager | Cambridge Micro | £17.80 | B,Econet | Sec | l |
| La Conjugaison | MedStat | £12.50 | B | Sec | l |
| La Princesse | Aztec | £6.50 | B,B+ | J/S | l |
| Le Vocab Kit | MedStat | £13.95 | B | Sec | l |
| Logifrench | Wida | £23 | B,Econet | Sec | l |
| Morse Code | Aztec | £3 | B,B+ | J/S | l |
| Parlons Anglais | Private Tutor | £7.95 | B,Electron | Sec | l |
| Quelle Tete | Cambridge Micro | £17.80 | B,Econet | Sec | l |
| Repondez | Heinemann | £20.12 | B | Sec | l |
| Russian Nouns | Wida | £23 | B,Econet | Sec | l |
| Russkie Slova | Wida | £34.44 | B,Econet | Sec | l |
| Russkiy Vybor | Wida | £34.44 | B,Econet | Sec | l |
| Rusview | CALL | £10 | B | Sec | l,aa |
| Saison de Achats | Wida | £20.13 | B,Econet | Sec | l |
| Spanish Tutor | Kosmos | £7.35 | B,B+,Electron | Sec | l |
| Spanish | Acornsoft | £11.05 | B | Sec | l |
| Speaking French, German, Italian, Spanish | Private Tutor | £7.95 | B,Econet | Sec | l |
| Tablero | Wida | £28.75 | B,Econet | Sec | l |
| Tekstereatif | Wida | £28.75 | B,Econet | Sec | l,jj |
| Telem-Nantes | Hodder | £19.55 | B | Sec | l,dd |
| Tense French | Sulis | £9.95 | B | Sec | l |
| Textbaumeister | Wida | £28.75 | B,Econet | Sec | l |
| Textfill | Carsondale | £9.95 | B | Sec | l |
| Umziehen | Cambridge Micro | £18.80 | B,Econet | Sec | l |
| Unifill | CALL | £15 | B | Sec | l |
| Unigap | CALL | £10 | B | Sec | l |
| Unitext | CALL | £30 | B | Sec | l |
| Uniview | CALL | £10 | B | Sec | l,aa |
| Verbs | Sulis | £7.35 | B | Sec | l |
| Vocab Tester | Beebugsoft | £10 | B | Sec | l |
| Vocab – European Languages | Wida | £28.75 | B,Econet | Sec | l |
| Wahlmeister | Wida | £28.75 | B,Econet | Sec | l |
| Wordstore – European Languages | Wida | £28.75 | B,Econet | Sec | l |

## MATHEMATICS

| TITLE | PUBLISHER | PRICE | MACHINE | AGE | TYPE |
|---|---|---|---|---|---|
| A-Level Maths | SUMS | £15 | B | Sec | m |
| Advanced Mathematics 1,2,3,4&5 | Nelcal | £30.48 | B,Econet | Sec | m |
| Algebra 'O' level | Ampalsoft | £5.13 | B | Sec | m |
| Algebra Programs | Acornsoft | £9.95 | A,B | Sec | m |
| All Aboard | Arnold Wheaton | £11.44 | B | Sec | m |
| Alpha Graph | Arnold Wheaton | £9.95 | B | J/S | m,u |
| Angle Tutor | Pee Bee | £9.95 | A,B | J/S | m |
| Angle | Chalksoft | £14.25 | A,B | J/S | m |
| Angle Turner | Arnold Wheaton | £9.95 | B | J/S | m |
| Angles/Navigate | Primary Programs | £5.95 | B | Ju | m |
| Angles Pupils Pack | S&S | £17.54 | B | Ju | m |
| Angles Teacher Pack | S&S | £17.54 | B | Teacher | m |
| Angles | Garland | £7 | B,B+,Electron | Ju | m |
| Angles 1-3 | Nelcal | £24.09 | B | J/S | m |
| Approximation, Estimation, Std Form | Heinemann | £20.12 | B | J/S | m |
| Area | Greenwood | £5 | B | Sec | m |
| Astro Maths | Scisoft | £5 | B | J/S | m |
| Basic Skills | Selective Software | £4 | B | J/S | m |
| Bearings | Nelcal | £21.79 | B | I/J | m |
| Beat the Clock | Arnold Wheaton | £9.95 | B | I/J | m |
| BelPlot | BelTech | £9.50 | B,B+,Electron | Sec | m |
| Bert Boot | Highlight | £6.95 | B | Ju | m |
| Bestfit | Greenwood | £5 | B | Sec | m,p |
| Binary Numbers | Chaddington | £10 | B | Sec | m |
| Calfax – the Presfax Calculator | S&S | £19.49 | B | Ju | m |
| Calculus "O" | Ampalsoft | £5.13 | B | Sec | m,q |
| Cars – Maths in Motion | Cambs Software | £18 | B | Ju | m,q |
| Cartesian | Flite | £24.90 | B,Electron | Sec | m,u |
| Chords | Aztec | £6.50 | B,B+ | J/S | m |
| Co-ordinates | Garland | £7 | B,B+,Electron | Ju | m |
| CoinA CoinB | Longman | £21 | B | J/S | m |
| Coins | ESM | £9.43 | B | Ju | m |
| Construction "O" | Ampalsoft | £5.13 | B | Sec | m |
| Cranky | ASK | £9.95 | B,Electron | Ju | m |
| Crossnumber | GSN | £12.08 | B | Teacher | m,q |
| Decimals | S&S | £14.32 | B | I/J | m |
| Decisions | ESM | £14.95 | B | I/J | m |
| Dieccoin | Longman | | B | J/S | m |
| Differences | ESM | £14.95 | B | I/J | m |
| Dragon Mix | Taskmaster | £9.95 | B | Ju | m |
| Early Learning | BBC | £10 | A,B | Inf | a,e |
| Early Mathematics | Heinemann | £13.80 | B | I/J | m |
| Early Years 1 & 2 | Orion | £7.95 | B | Inf | m,e |
| Easiplot | Synergy | £15.95 | B,B+,Electron | Sec | m |
| Equations Suite | Garland | | B | Ju | m |
| Estimation | Hodder | £27.60 | B,Electron | I/J | m |
| Euclidean Geometry | Impact | £9.95 | B | Sec | m |
| Evidence | Longman | £14.89 | B | J/S | m |
| First Steps in Algebra | Small School | | B | Sec | m |
| Fraction Suite | Wida | £23 | B,Econet | I/J | m |
| Fun Academy | Shards | £14.95 | B | J/S | m,v |
| Fun Maths | Cambridge Micro | £13.95 | B | J/S | m |
| Fundamental Algebra | Griffin | £11.95 | B | Sec | m |
| Funplot | Ed Soft | £5.95 | B | I/J | m |
| Geometrical Transformations | Edward Arnold | £26.50 | B | Sec | m |
| Golfer | Strawberry Fair | £8.95 | B | J/S | m |
| Graphical Representation | Drake | £8 | B | Ju | m |
| Graphics Calculus | Glentop | | B | Sec | m |
| Happy Times | ESM | £14.95 | B | I/J | m |
| Hexallation | Cambridge Micro | £11.71 | B | I/J | m |
| Highwire | Englefield | £6.25 | B | Ju | m |
| Igraph | MEDUSA | £11.50 | B | Sec | m |
| Infant Maths Series | MRH Systems | £24.95 | B,Electron | Inf | m |
| Infant Maths Snap | Sherston | £10.35 | B | Inf | m,n |
| Infant Suite | Primary Programs | £9.95 | B | Inf | m,e |
| Introductory Algebra | Impact | £19.95 | B | Sec | m |
| Introduction to Trigonometry | Griffin | £11.95 | B | Sec | m |
| Investigator | Longman | £12.59 | B,Econet | J/S | m |
| Jars | Acornsoft | £15.35 | B | Sec | m |
| Jungle Maths | Scisoft | £5 | A,B | I/J | m |
| Junior Maths | ESM | £15.95 | B | Ju | m |
| Junior Maths | Micro Power | £6.95 | B | Ju | m |
| Junior Maths | Aztec | £3 | B,B+ | Ju | m |
| Kestrel First Collection | BESS | £24 | B | I/J | m |
| L | ATM | £10 | B | J/S | m,q |
| Lasermaths | Logical | £7.50 | B | Ju | m |
| Launching Logic | ESM | £14.95 | B | I/J | m |
| Learn Addition, Multiplication, Division, Subtration | ABC | £7.50 | B | Inf | m |
| Learning mathematics | Heinemann | £13.80 | B | J/S | m |
| Length | S&S | £14.32 | B | J/S | m |
| Lessons in Maths with a Micro | ATM | £15 | B | Sec | m |
| Little Red Riding Hood | Selective Software | £5 | B | I/J | m |
| Logic Puzzles | Educational Software | £9.78 | B | J/S | m |
| Match1/Match2 | MUSE | £7 | B | I/J | m |
| Mathematical Concepts | Drake | £8 | B | I/J | m |
| Mathematical Investigations | Capital Media | £8 | B | I/J | m,ll |
| Mathematics with a micro | Heinemann | £25.30 | B | Sec | m |
| Mathemagic Land | LTS | £9.95 | B | J/S | m |
| Mathematics 1&2 | Acornsoft | £12.65 | B,B+ | cc | m |
| Mathematics Games and Activities | Capital Media | £8 | B | I/J | m |
| Maths 1 | Tutorial | £11.95 | B,Electron | Sec | m |
| Maths Level 4 | Ginn & Co | £16 | B | J/S | m |
| Maths Revision | Abacus | £12.95 | B | Sec | m |
| Maths Level 6 | Ginn & Co | £16 | B | J/S | m |
| Maths "O" | Ampalsoft | £11.05 | B | Sec | m |
| Maths Master | GSN | £14.38 | B | Ju | m |
| Maths with a Story | BBC | £10.95 | B | J/S | m |
| Maths Level 7 | Ginn & Co | £16 | B | J/S | m |
| Maths Level 5 | Ginn & Co | £16 | B | J/S | m |
| Maths Snap | Sherston | £7.48 | B | Ju | m,n |
| Maths Topics | Cambridge Micro | £15.95 | B,Econet | Sec | m |
| Maths Translations | Corona | £5 | B | Sec | m |
| Maths Talk | LTS | £9.95 | B | Ju | m |
| Mathskills I & II | Griffin | £11.95 | B | Sec | m |
| Mathsman | GED | £4 | B | Ju | m |
| Matrices | Bryants | | B | Sec | m |
| Matrices | Chaddington | £10 | B | Sec | m |
| Measurement | Britannica | £75 | B | Inf | m,ee |
| Merlin Teaches Tables Pack | Hodder | £17.25 | B | I/J | m |
| Meteor Multiplication | Taskmaster | £9.95 | B | Ju | m |
| Metrics Quiz Plus | Chalksoft | £14.25 | B | J/S | m |
| Micro Maths Suite | LCL | | A,B | Sec | m |
| Microsmile 1 & 2 | Centre for Learning Resources | £15 | B | I/J | m |
| Middle School Maths | Scisoft | £6.95 | B | J/S | m |
| Minus Mission | Taskmaster | £9.95 | B | I/J | m |
| Missing Signs | Acornsoft | £15.35 | B | J/S | m |
| Mland | Greenwood | £5 | B | J/S | m |
| Mmaths | Ed Soft | £4.95 | A,B,B+,Electron | Ju | m |
| Money Plus | Fernleaf | £31.26 | B | J/S | m |
| Monster Maths | Shards | £6.95 | B | I/J | m |
| Motion Geometry | Garland | £7 | B,B+,Electron | Ju | a |
| Music Maestro 1-4 | Mupados | £15.49 | B | J/S | m |
| Nightmare Maths | Logical | £7.50 | B | Ju | m |
| Number and Money | ESM | £8.20 | B | I/J | m |
| Numerical Methods 2 | ISMeC | | B | Sec | m |
| Number Five | Chalksoft | £14.25 | B | Ju | m |
| Numeracy 1,2,3,4,5 | ESM (Shiva) | £55 | B | Ju | m,n |
| O-level Maths | Scisoft | £7.95 | B | Sec | m |
| Ordering | ESM | £14.95 | B | I/J | m |
| Pascal | Chalksoft | £6.95 | B | J/S | m |
| Passit Transgeometry | Ed Soft | £5.95 | B,B+ | Sec | m |
| PEAC 2 | RESOURCE | £10.95 | B | I/J | m |
| Pictorial Representation | ABC | £8.50 | B | I/J | m |
| Picture Maths | AJ | £9.95 | B | I/J | m |
| Pirates | Longman | £20.13 | B,Econet | J/S | m |
| Placeval | Ed Soft | £4.95 | A,B,B+ | Ju | m |
| Playing with Places | ESM | £14.95 | B | I/J | m |
| Plotter | Selective | £5.50 | B | J/S | m,u |
| Plotting Graphs | Heinemann | £18.40 | B | Sec | m,u |
| Primary Maths Pack | RESOURCE | £11.95 | B | I/J | m,ll |
| Polygon Tutor | Pee Bee | £7.50 | A,B | Sec | m |
| Probability | Selective | £5 | B | Sec | m |
| Programs for Mathematical Computing | MEI | £17.50 | B,B+Elk,Econet | Sec | m |
| Pythagoras' Theorem | Griffin | £11.95 | B | Sec | m |
| Quadratic Equations | Longman | £18.34 | B | Sec | m |
| Quadratic Functions "O" | Chaddington | £10 | B | Sec | m |
| Ratio | Garland | £7 | B,B+,Electron | Ju | m |
| Scalde | MUSE | £6.50 | B,B+ | Sec | m |
| Scales | Heinemann | £20.12 | B | Sec | m |

# EDUCATION

| TITLE | PUBLISHER | PRICE | MACHINE | COMMENT | KEY |
|---|---|---|---|---|---|
| Scales | Strawberry Fair | £8.95 | B | J/S | m |
| Scottish Primary Maths Group | Heinemann | £56.93 | B | J/S | m |
| Secondary Mathematics | Heinemann | £13.80 | B | Sec | m |
| Sets and Operators | ESM | £14.95 | B | I/J | m |
| Shape Up | ASK | £9.95 | B,Electron | Ju | m |
| Shape and Race | H&H | £5.50 | B | I/J | m |
| Shares for All | ESM | £14.95 | B | I/J | m |
| Shoot | Soft Centre | £6.90 | B | Ju | m |
| Signals and Magic | H&H | £5.50 | B | J/S | m |
| Simple Equations | Drake | £8 | B | I/J | m |
| Sorting | Drake | £8 | B | Inf | m |
| Slimwam 1&2 | ATM | £17 | B | I/J/Sec | m,ll |
| Special Poducts | Impact | £14.95 | B | Sec | m |
| Spider | Cambridge Micro | £11.71 | B | I/J | m |
| SPMG Metric Units of Weight | Heinemann | £12.50 | B | J/S | m |
| Squeeze | ASK | £9.95 | B,Electron | I/J | m |
| Submarines | GED | £4 | A | Ju | m |
| Sum Up | Learnwell | £4 | B,Electron | Ju | a |
| Supergraph | Glentop | | B | Sec | m,gg |
| Symbols | Britannica | £75 | B | Inf | m,ee |
| Symmetry | Acornsoft | £14.95 | B | Sec | m |
| Table Test 1-4 | Drake | £8 | B | Ju | m |
| Tables Adventure | ASK | £9.95 | B,Electron | I/J | m |
| Tables | AVC | £3 | B | Ju | m |
| Tables Teacher | Dr Soft | £6.95 | B | Ju | m |
| Tables | Bryants | £5.10 | B,B+ | Ju | m |
| Tablesums | Griffin | £9.95 | B | Ju | m |
| Tasmath | Tasman | £5.95 | B | Sec | m |
| Teacher in the Custard | Pee Bee | £8.50 | A,B | I/J | m |
| Tecdv | Longman | £20.13 | B | Sec | m |
| Tess | H&H | £7.50 | B | J/S | m |
| Tessellations | Cambridge Micro | £23.43 | B,Econet | J/S | m |
| Tesselator | Addison Wesley | £21.95 | B | J/S | m |
| The Cross number puzzle | Darwood | £4.65 | A,B | I/J | m |
| Tick-tock | Nisbet | £8.05 | B | I/J | m |
| Time | S&S | £17.54 | B | Ju | m |
| Times Tables | Aztec | £3 | B,B+ | I/J | m |
| Timetable/Clock | Primary programs | £5.95 | B | J/S | m |
| Transformations, Calculus, Trigonometry and Sketching | Educational Software | £23 | B | Sec | m |
| Travel | S&S | £16.04 | B | J/S | m |
| Treasure Hunt | Kingfisher | £7.50 | B,B+ | Ju | m |
| Tree of Shapes | Bryants | £5.10 | B,B+ | J/S | m,dd |
| Triangles | Chalksoft | £9.25 | B | J/S | m |
| Triangle Tutor | Pee Bee | £6.50 | A,B | J/S | m |
| Triangles/Regular Shapes | Primary Progress | £5.95 | B | J/S | m |
| Trigonometry "O" | Ampalsoft | £5.13 | B | Sec | m |
| Trigonometry Basics | Impact | £14.95 | B | Sec | m |
| Tryangles | Earth Science | £14.95 | B | Sec | m |
| Tstar | MUSE | £7 | B,B+ | Ju | m |
| Vectors | Cambridge Micro | £15 | B | Sec | m |
| Vedic Multiplication | Wida | £23 | B,Econet | J/S | m |
| Venn | MUSE | £6 | B | Sec | m |
| Venn Diagrams | GSN | £14.38 | B | J/S | m |
| Vortex | Cambridge Micro | £11.71 | B | I/J | m |
| Wizard's Revenge | Sherston | £14.38 | B | Ju | m |

PHYSICS

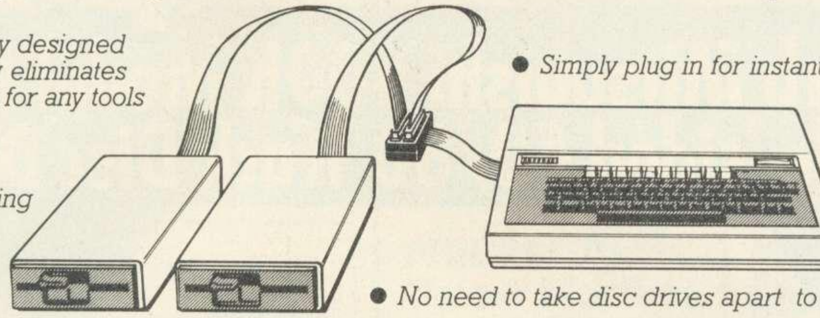
| TITLE | PUBLISHER | PRICE | MACHINE | COMMENT | KEY |
|---|---|---|---|---|---|
| 16+ Physics | Herdman | £12.95 | B | Sec | p |
| A to D | MegaCyCAL | £12 | B | Sec | p |
| Acoustics | Longman | £20.13 | B,Econet | Sec | p |
| Advanced Organic Chemistry | Herdman | £12.95 | B | Sec | p,c |
| Ampli | SciCAL | £11.75 | B | Sec | p |
| Ampli | MegaCyCAL | £12 | B,Electron | Sec | p |
| Astruct | MUSE | £7 | B,B+ | Sec | p |
| Atoms | Weaversoft | £7.95 | B | Sec | p |
| Barrage | Micro Power | £7.95 | B | Sec | p,s |
| Bell | MUSE | £5.50 | B,B+ | J/S | p,s |
| Capacitor | Longman | £20.13 | B,Econet | Sec | p,s |
| Circuit Designer | Paean Systems | £24.95 | B | Sec | p |
| Collisions | Longman | £20.13 | B,Econet | Sec | p,s |
| Confunc | MegaCyCAL | £12 | B | Sec | p |
| Counter Currents | Longman | £20.13 | B,Econet | Sec | p |
| Current Balance | GSN | £14 | B | Sec | p |
| D to A | MegaCyCAL | £12 | B | Sec | p |
| D.C. | MegaCyCAL | £9.95 | B,Electron | Sec | p |
| D-Logic | MegaCyCAL | | B | Sec | p,s |
| Decay | GSN | £17.25 | B | Sec | p |
| Demonstration Programs | Longman | £20.13 | B,Econet | Sec | p |
| Density | Acornsoft | £11.90 | B | Ju | p |
| Determination of Electrostatic Constant | GSN | £17.25 | B | Sec | p |
| Digital Electronics | Garland | £16.68 | B | Sec | p,i |
| Dynamic Modelling System | Longman | £40.25 | B | Sec | p |
| Dynamo | Notts Council | £9.95 | B | J/S | p |
| Einstein's Quanta Simulation | GSN | £17.25 | B | Sec | p |
| Electonics in Action | BBC | £17.20 | B | Sec | p |
| Electrostatics | Garland | £11.75 | B,B+,Electron | Sec | p |
| Electromagnetic Spectrum | BBC | £17.20 | B | Sec | p |
| Electrons | MUSE | £6.50 | B,B+ | Sec | p,s |
| Electrical Equipment Data | AUCBE | £11.50 | B,Econet | Sec | p |
| Electricity Impedance | Longman | £20.13 | B,Econet | Sec | p |
| Electricity "A" | Longman | £23 | B,Econet | Sec | p |
| Electricity | Primary Progress | £5.95 | B | J/S | p |
| Field Line Simulation | Garland | £10 | B,B+,Electron | Sec | p |
| Floater | Cambridge Micro | £18.41 | B,Econet | Sec | p |
| Floating and Sinking | Longman | £18.34 | B,Econet | Sec | p |
| Fluid Mechanics | Pitmansoft | £22.94 | B | Sec | p |
| Frequency Response | MegaCyCAL | £12 | B,Electron | Sec | p |
| Friction | Wiley | £34.95 | B | Sec | p |
| Gaseous Diffusion | Longman | £20.13 | B,Econent | Sec | p |
| General Physics "A" | Longman | £34.50 | B,Econet | Sec | p |
| Gravity | Longman | £20.13 | B,Econet | Sec | p |
| Heating a Wire | Longman | £17.83 | B | J/S | p |
| Howe can faulty electrical components be identified? | Modular | £37.50 | B | Sec | p |
| How can nuclear instability provide source of energy? | Modular | £37.50 | B | Sec | p |
| Hydraulics | Database | £5.50 | B | Sec | p |
| Images | MagaCyCAL | £9.95 | B,Electron | Sec | p |
| Interference and Diffraction of Waves | Edward Arnold | £16 | B | Sec | p |
| Investigating Circuits | Longman | £20.13 | B | Sec | p |
| Isaac | Earth Science | £14.95 | B | Sec | p |
| Lenses | Heinemann | £20.12 | B | Sec | p |
| Linear Motion | Wiley | £34.95 | B | Sec | p |
| Longitudional Waves | Heinemann | £14.38 | B | Sec | p |
| Magnets | Macmillan | £6.95 | B | J/S | p |
| Mass Spectrometer | Longman | £20.13 | B,Econet | Sec | p,s |
| Middle Secondary Physics Pack | Longman | £34.50 | B,Econet | Sec | p |
| Millikan's Oil Drop Experiment | GSN | £17.25 | B | Sec | p |
| Models in Physics | Garland | £11.75 | B | Sec | p |
| Molecular Behaviour | Ardsoft | £6 | B | Sec | p |
| Momentum | Longman | £20.13 | B,Econet | Sec | p,s |
| Momentum and Impacts | Wiley | £34.95 | B | Sec | p |
| Motion | MegaCyCAL | £9.95 | B,Electron | Sec | p |
| Multiple Slit Interference | GSN | £17.25 | B | Sec | p |
| Newton | Edward Arnold | £15 | B | Sec | p |
| Newton and the Shuttle | BBC | £23 | B | Sec | p |
| Nuclear Reactor Simulation | Longman | £16.68 | B,Econet | Sec | p |
| Nuffield Physics Pack | Longman | £34.50 | B | Sec | p |
| O/A Level Physics Definitions | Akadamias | £9.95 | B,Econet | Sec | p |
| Operational Amplifiers | MegaCyCAL | £12 | B,Electron | Sec | p |
| Optics | MUSE | £6.50 | B,B+ | Sec | p |
| Optics | Hutchinson | £19.16 | B | Sec | p |
| Oscilloscope | Garland | £15 | B,B+,Electron | Sec | p |
| Particle Scattering | Edward Arnold | £13.04 | B | Sec | p |
| Pendulum | MUSE | £7 | B,B+ | Sec | p |
| Photo-electric Effect | Longman | £20.13 | B,Econet | Sec | p,s |
| Physics | Micro Power | £6.95 | B | Sec | p |
| Physics Disc 3 | Garland | £18.18 | B | Sec | p |
| Physics Revision | Abacus | £12.95 | B | Sec | p |
| Physics Disc | Garland | £31.75 | B | Sec | p |
| Physics Suite 2 | Griffin | £12.95 | B | Sec | p |
| Physics | Garland | £36.51 | B,B+,Electron | Sec | p |
| Physics | Longman | £14.50 | B | Sec | p |
| Physics | Tutorial | £11.95 | B,Electron | Sec | p |
| Physics Suite | GSN | £11.50 | B | Sec | p |
| Physics Experiments | MEDUSA | £10 | B | Sec | p |
| Physprob | AVC | £3 | A,B | Sec | p,q |
| Primary School Science Project | Glentop | | B | Ju | p,b |
| Projectile Motion | Wiley | £34.95 | B | Sec | p |
| Projectiles | Garland | £10 | B,B+,Electron | Sec | p,s |
| Qbank Physics | In-sight | £30 | B | Sec | p,hh |
| Radioactive Decay | Longman | £20.13 | B,Econet | Sec | p |
| Rayleigh | GSN | £14 | B | Sec | p |
| Reaction Kinetics | Edward Arnold | £16 | B | Sec | p |
| Reilly | Earth Science | £12.95 | B | Sec | p |
| Resistor | RJE | £4.95 | B | Sec | p |
| Revise Physics | MegaCyCAL | £8.50 | B,Electron | Sec | p |
| Ripple Tank/Wavenotes | MUSE | £9.50 | B | Sec | p |
| Space Track | Cambridge Micro | £11.71 | B | J/S | p,c |
| Speed and Light | Acornsoft | £11.90 | B | JU | p |
| Switches and Diodes | Garland | £11.75 | B,B+,Electron | Sec | p,s |
| Temperature Control | Acornsoft | £9.95 | B | Sec | p,s |
| Thermal Equilibrium | Garland | £11 | B,B+,Electron | Sec | p |
| Transverse Waves | Heinemann | £20.12 | B | Sec | p |
| Uniformly Accelerated Motion | BBC | £19.95 | B | Sec | p |
| Velocity of Light | GSN | £17.25 | B | Sec | p |
| Watts | Cambridge Micro | £15.95 | B,Econet | Sec | p |
| Waveform Analysis | Garland | £11.26 | B,B+,Electron | Sec | p |
| Waves | BBC | £17.20 | B | Sec | p,s |
| Waves | MegaCyCAL | £9.95 | B,Electron | Sec | p |
| Waves and Vibrations | Griffin | £9.95 | B | Sec | p |
| Why do we say thanks to Newton? | Modular | £37.50 | B | Sec | p |
| X-ray Crystallography | GSN | £14 | B | Sec | p |
| Young's Slits | Heinemann | £23 | B | Sec | p |

ASTRONOMY

| TITLE | PUBLISHER | PRICE | MACHINE | COMMENT | KEY |
|---|---|---|---|---|---|
| Astronomy | BBC | £9.20 | B,Electron | Sec | z |
| Constellation | Micro Power | £6.95 | B | Sec | z |
| Night Sky | Bridge | £9.90 | B,B+ | Sec | z |
| pH/Titrations | IRL | £22.50 | B,B+ | Sec | z |
| Planet Patrol | Macmillan | £6.95 | B | J/S | z,q |
| Planetary Motion | Longman | £20.13 | B | Sec | z |
| Satellite Orbits | Edward Arnold | £16 | B | Sec | z |
| Space Scan | Macmillan | £10.50 | B | I/J | z |
| Starfinder | Century | £12.95 | B | J/S | z |
| Starmap | Heinemann | £18.40 | B | Ju | z |
| Stars | AUCBE | £13.80 | B,Econet | Sec | z |
| Starseeker | Mirrorsoft | £9.95 | B,Electron | Sec | z |
| Sulphuric Acid | Longman | £14.50 | B,Econet | Sec | z |
| Symbols to moles | Heinemann | £20.12 | B | Sec | z |
| Titration | Garland | £11 | B,B+,Electron | Sec | z |

# DUAL DRIVES FOR LESS THAN £17?

## Convert your single disc drives into duals for only £16.95 inc. VAT



- *Specially designed circuitry eliminates the need for any tools*
- *No soldering*
- *Simply plug in for instant dualling*
- *No mess*
- *New improved longer cable reaching the back of the computer*
- *No need to take disc drives apart to change links*

**The Viglen DUCK (D**ualling **U**p **C**onnector **K**it**) can convert single drives to duals, instantly!**

Just plug the **Viglen Duck** into the BBC micro and any two single disc drives to create a dual disc drive. Drives will be configured Drive 0 and Drive 1 automatically.

- *Fast Back-Up*
- *Fast Copying of Files*

The **Viglen Duck** will dual-up any make or type of single disc drives *with PSU* (power supply unit). It will also work on single and double-sided drives in any combination. If you have disc drives *without* built-in PSU, then you will require a dual power connector for the BBC micro – available from Viglen for only **£8.00** inc VAT.

- Postage and packing **£2.50** inc. VAT.
- *Official Orders from Government and Educational Establishment welcomed.*

Viglen

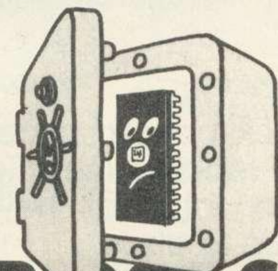
**Orders to: Viglen Computer Supplies Unit 7, Trumpers Way, Hanwell W7**

**Credit Card holders may order by telephone: 01-843 9903**

**All prices correct at time of going to press**



# YOUR ROMS WOULD BE HAPPIER IN A VIGLEN ROM CARTRIDGE SYSTEM



**Tel: 01-843 9903 ACCESS/BARCLAYCARD** Credit Card holders can purchase by telephone. Please give Card No., Name, Address, and items required.

The safest way to look after your growing collection of ROMs is to store them in Viglen's specially designed cartridge systems, this not only keeps them happy, but also removes the risk of damage to your BBC micro.

There are two systems – the 'Standard' and the 'Low Profile'. Viglen is the leading producer of both.

**ADVANTAGES OF VIGLEN ROM CARTRIDGE SYSTEM**

● All cartridges are gold-plated for durability and reliability, unlike others which are only silver plated. ● No need to switch machine off between cartridge changes. ● Insert and remove 'Wordwise' 'View' 'Disc Doctor', etc., at will, from your micro in absolute safety. ● Low, low power consumption unlike other systems. ● Save on memory.

**THE STANDARD SYSTEM**

**Over 50,000 sold**



The Standard System used extensively in education is preferred, due to its robust construction and ease of use.

**LOW PROFILE SYSTEM**



With the sideways entry on the low profile system access to the escape and tab keys are slightly restricted. However Viglen betters its rivals in this respect by being 3mm lower.

Viglen



**PRICE FOR COMPLETE KIT,** including 1 cartridge, 1 Cable Assembly, 1 Blanking Off Plate (used if system is removed), 1 Socket Cover (used when no cartridges are resident), 1 Cartridge Storage Rack. **£15.95**

Extra Cartridges: £2.95 each, four for £11.00, ten for £26.50. Kit comes with 1 ROM Cartridge. All prices inc. VAT.

Personal Callers
Mon – Fri 9.30-5.30pm Sat 9.30-4pm

**Post to: VIGLEN Unit 7 Trumpers Way Hanwell W7 2QA**

Please send me (state type and quantity) ________ Kit(s) ________ Cartridges

I enclose Cheque/P.O. for £________ Please add £2.50 for postage and packing (50p only for single cartridge)

I prefer to pay by ACCESS/BARCLAYCARD * (Delete whichever is not applicable).

Card No. ________ Signature ________

Name ________ Address ________

AU5/2

Credit Cards valid if signed by Cardholder. Address must be the same as card holder's.

# A VERY SPECIAL OFFER from Viglen

**PLEASE CALL FOR LATEST LOW PRICES**

## The Superb Mitsubishi 400K LATEST Model M4853 Double-sided 40/80 Track Disc Drive




At Viglen's rock bottom prices, everyone can afford to replace inefficient cassette tape units and obtain all the advantages of changing up to discs.

**12 MONTH WARRANTY (Extended 2 year warranty available)**

**£119**
**400K 40/80 TRACK DISC DRIVE INC. VAT**

Latest Acorn 1 DFS (DNFS) Call at factory for free fitting. £59 (with disc drive only).

| Single Drives 40/80 400K | |
|---|---|
| Single Drive | £119 |
| Drive + Acorn DFS | £178 |
| Integral PSU for single drive | £22 |

| Dual Drives 40/80 800K | |
|---|---|
| Dual drives | £238 |
| Dual drive + Acorn DFS | £297 |
| Integral PSU for Dual Drive | £28 |

**All offers include**
**Utilities Disk** includes formatting verifying, BASIC program comparator, disassembler, Epson screen dump, dual catalogue (giving 62 files), large printing and many others.
**Comprehensive Manual**
a fact-filled, 56 page document, includes techniques of loading from cassette to disk.
Not available elsewhere

AA64

**Carriage.** Add £12 in each case. Usually despatched next day. Price covers courier-delivery and insurance. Prices include VAT.
*Prices correct at time of going to press – Offer subject to availability.*

**Call in at our Showroom**
Weekdays:
9.30 – 5.30
Saturdays:
9.30 – 4

**Sales Hotline 01-843 9903**
Please call for latest prices, product details and to place credit card orders.
Government & Educational Establishments enquiries welcome on this number.

**After Sales Line 01-571 6313**
For dispatch enquiries, invoice queries, service and all other enquiries.

Post to: Viglen Computer Supplies, Unit 7, Trumpers Way, Hanwell W7 2QA.
Please send me (specify all items)
Add £12 carriage
I enclose Cheque/P.O. for £
Name
Address
I prefer to pay by ACCESS/BARCLAY CARD
Card No.
Signature
AU5/3




*the best partners for your computer*

**PLEASE CALL FOR LATEST LOW PRICES**

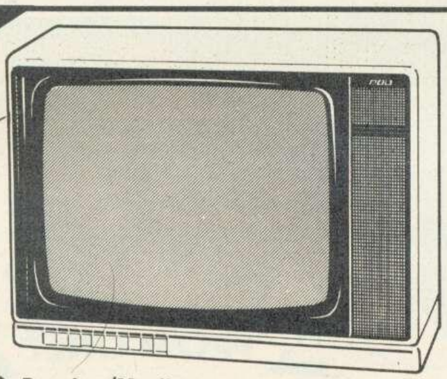
# All the peripherals for your BBC Model B

*the best service – the best value*

## Monitors

*NEW*

### PHILIPS Colour TV/ Monitor Model 1114



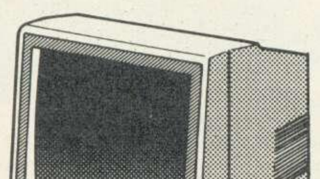
**14" Tube (V34cm) Receiver/Monitor**

● Light and compact finished in white with dark picture surround. ● In-line 14" picture tube provides a sparkling picture in seconds. ● Designed to give exceptional reliability and performance. ● 10 pre-select channel buttons. ● Headphone/tape recorder socket with separate loudspeaker mute switch. ● Loop aerial and main aerial connection. ● RF, CVBS and RGB inputs.




Price **£199** inc. VAT

### PHILIPS Model BM7502 Green Screen Mono



From the highly successful 'Philips 80 Range', here is a monitor specially designed to display graphics and alphanumeric data with perfect clarity.
● 12" high resolution, 20MHz band width, anti-glare screen.
● Composite Video (CVBS) and Audio Input. ● 2000 character (80 x 25) display. ● Amber screen – £6 extra. ● Ideal low price for your BBC B.

**ONLY £85 INC. VAT**

***PLEASE ENQUIRE ABOUT OUR EXTENSION KEYBOARDS, KEY PADS & EPROM PROGRAMMER***

## Discs

### 3M Scotch Discs

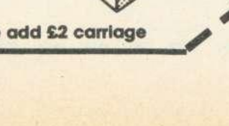
**5¼" single-sided diskettes**

**10 DISCS PER BOX**

Double density: lifetime guarantee

| | |
|---|---|
| SS 40 TRACK | £13.00 |
| DS 40 TRACK | £16.00 |
| SS 80 TRACK | £19.50 |
| DS 80 TRACK | £22.00 |

***Prices include VAT***



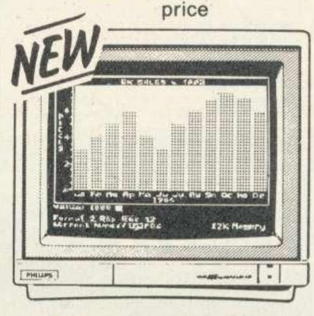
**Please add £2 carriage**

### PHILIPS *NEW* Colour Monitors Model CM8501

● Std resolution. ● Grey glass screen. ● RGB – linear/TTL – inputs (SCART/8 Pin DIN). ● Audio input. ● Bandwidth 8 MHz. ● Adjustable foot.

Price £ Please call for lowest low price INC. VAT

*NEW*



### Model CM8533

● Med. resolution. ● Dark glass etched screen. ● Composite video input (phono). ● RGB – linear input (SCART). ● RGB/RGBI – TTL input (8 Pin DIN). ● Audio input. ● Green (Mono) switch. ● Bandwidth 12 MHz. ● Adjustable foot.

Price **£299** INC. VAT

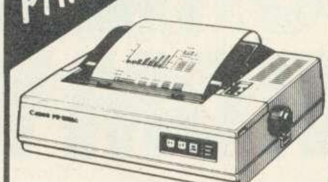
### Microvitec Monitors



| | |
|---|---|
| Standard | £219 |
| Med | £289 |
| High | £429 |
| Med & Pal | £329 |

**Prices correct at time of going to press. Offers subject to availability.**

## Printers



### Dot Matrix

| | |
|---|---|
| Taxan Kaga KP810 | £229 |
| Canon PW1080A | £279 |

### Daisy Wheel

| | |
|---|---|
| Juki 6100 | £299 |
| Quen Data | £199 |
| Epson DX100 | £359 |

Please add £8 for 1½ metre length printer lead for the BBC micro.

**BBC MASTER 128K £489 inc VAT**

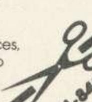



Visit our showroom: Open 9.30 – 5.30 Mon to Sat. 9.30-4.00 Saturdays

**Sales Hotline 01-843 9903**

Please call for latest prices, product details and to place credit card orders. Government and Educational Establishments enquiries welcome.

All prices inc VAT



**Post to: VIGLEN COMPUTER SUPPLIES, UNIT 7, TRUMPERS WAY, HANWELL W7 2QA. Telephone: 01-843 9903.**

Please send me ______

Please add £8 carriage per item (except discs) I enclose Cheque/P.O. for £______

I prefer to pay by ACCESS/BARCLAYCARD* (Delete whichever is not applicable)

Card No ______

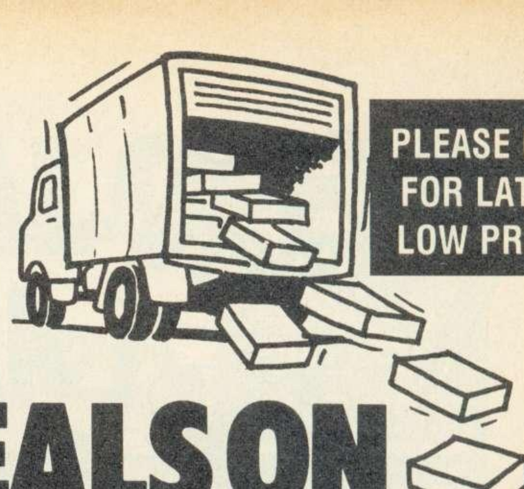
Signature ______

Name ______

Address ______

AU5/4

*The only way you might get a cheaper deal on your TEAC disc drive. . .*



**PLEASE CALL FOR LATEST LOW PRICES**

# BUT THE BEST DEALS ON THE SUPERB TEAC DRIVES COME ONLY FROM VIGLEN




VIGLEN and the outstanding TEAC range of disc drives make the ideal team mates for your computer, giving you fast responsive data access in seconds.

## Our highly competitive prices

| SINGLE DRIVES 40/80 400K | | DUAL DRIVES 40/80 800K | |
|---|---|---|---|
| Single Drive | **£129** | Dual Drives | **£258** |
| Drive + Acorn DFS | **£188** | Dual Drives+ Acorn DFS | **£317** |
| Integral PSU for single drive | **£22** | Integral PSU for dual drive | **£28** |

Latest Acorn 1.2 DFS(DNFS). Call at factory for free fitting **£59** (with disc drive only)

**All Offers include:**
Utilities Disc includes formatting, verifying BASIC program comparator, disassembler, Epson screen dump, dual catalogue (giving 62 files), large printing and many others.
All drives supplied with case, ribbon and power cables and comprehensive 56 page manual.




**Remember,** whichever make of drive you purchase from Viglen, you can be assured of an excellent back-up service. Prices correct at time of going to press – offers subject to availability.

**How to order: by post –** To purchase any of these items, simply fill in the coupon with your requirements. Enclose your Cheque/P.O. or use your Access/Barclaycard. Please make cheques payable to VIGLEN COMPUTER SUPPLIES and post to the address above. Allow seven days for delivery, add £12.00 carriage, packing and insurance on all items.

**By telephone:** Ring **(01) 843 9903**. Credit Card holders (Access/Barclaycard only) can purchase by telephone. Please give Card No., Name, Address and items required.

Viglen are also major suppliers to educational and government establishments and welcome further enquiries and orders.

*THE BEST PARTNERS FOR YOUR COMPUTERS*

Showroom/factory open
Monday – Friday 9.30–5.30
Saturday 9.30 – 4.00
**Tel: 01-843 9903**




free parking

**Post to:**
**Viglen Computer Supplies**
**Unit 7, Trumpers Way**
**Hanwell, W7 2QA**

Credit cards valid if signed by card holder. Address on coupon must be same as card holder.

ACCESS | BARCLAYCARD VISA

AU5/5

Please send me (state item number, type and quantity) ....................

I enclose Cheque/P.O. for £ .................... add £12.00 carriage

Name ....................

Address ....................

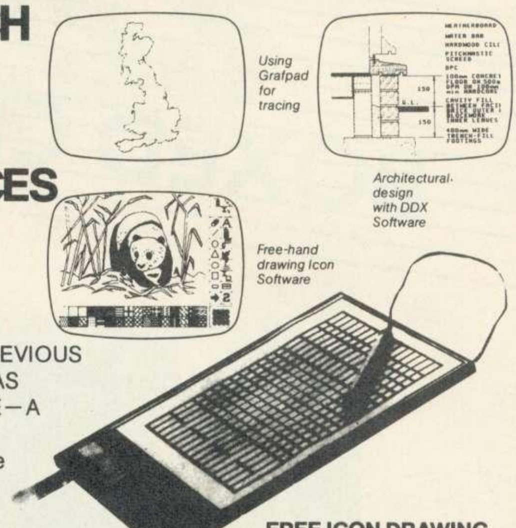
I prefer to pay by ACCESS/ BARCLAYCARD (delete whichever is not applicable)

Card No ....................

Signature ....................

# THE AMAZING GRAFPAD II

## AVAILABLE FOR IMMEDIATE DESPATCH FROM Viglen




## THE ULTIMATE IN GRAPHIC INPUT DEVICES FOR THE BBC MICRO.

GRAFPAD II: ● A brilliant British invention manufactured in Gt. Britain, unequalled in the world of graphics input.

SPECIFICATION
**Resolution:**
**1280 x 1024 pixels**
**Repeatability:**
1 pixel
**Output rate:**
**2000 co-ordinate pairs per sec.**
**Interface:**
parallel
**Origin:**
LH corner or selectable
**Dimensions:**
350 x 260 x 12 mms.

IT COMBINES IN ONE DEVICE ALL THE FACILITIES OF PREVIOUS ATTEMPTS AT INPUT DEVICES. THE APPLICATIONS ARE AS NUMEROUS AS THAT OTHER COMMONLY HELD DEVICE — A PEN! — AND INCLUDE: ● Option Selection ● Form Input ● Data Collection ● Logic Design ● Circuit Design ● Picture creation ● Picture storage ● Picture retrieval ● Construction design ● C.A.D. ● Text Illustration ● Games ● Pattern Design ● Education ● PCB Design

**● A4 SIZE DRAWING AREA ● HIGH RESOLUTION COLOUR ● HOME AND BUSINESS USE ● VARIETY OF OPTIONAL PROGRAMMES ● FREE HAND DRAWING ● CIRCUIT DIAGRAMS ● C.A.D. ● PCB LAYOUTS ● EASY TO USE**

**FREE ICON DRAWING SOFTWARE WITH EACH GRAFPAD II ON DISC**

**£59.50 inc. VAT**

***EDUCATION & DEALER ENQUIRIES WELCOMED***

Post to: Viglen Computer Supplies, Unit 7, Trumpers Way, Hanwell W7 2QA. Phone: 01-843 9903.

AU5/6

Please Send me (specify items) ______ I enclose Cheque/P.O. for £ ______ Add £2 p&p or £8 for courier insured delivery.

Cheques payable to Viglen Computer Supplies or debit my ACCESS/BARCLAYCARD No. ______

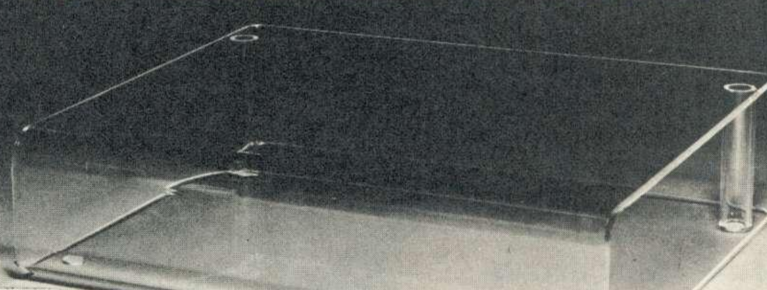
NAME: ______ ADDRESS ______

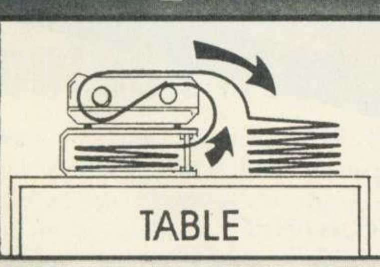
You can pay by credit card or telephone your order.

Signature ______

# NEW! A PRINTER STAND

## from Viglen COMPUTER SUPPLIES






- For 80 column matrix printers
- Raises printer high enough to put continuous stationery underneath
- Beautifully finished in clear perspex ● Viglen quality every time
- Will accept paper up to 12½″ wide ● Non slip rubber pads
  Dimensions: 15″ (380mm) wide (320mm) deep 4″ (90mm) high
  Also available 136 column stand @ £27 inc. VAT.

Printer Stand
£16·95 INC. VAT
Carriage & Packing £3.00

**COME TO VIGLEN FOR A FAST, FRIENDLY, PERSONAL SERVICE**

DEALER ENQUIRIES WELCOME

Orders welcomed from educational establishments and government departments

**Prices subject to change without notice**

Post to: VIGLEN COMPUTER SUPPLIES, UNIT 7, TRUMPERS WAY, HANWELL, LONDON W7 2QA.

AA63

Please send me ______ (qty) PRINTER STANDS at £19.95 each. I enclose Cheque/P.O. for £ ______ made out to VIGLEN COMPUTER SUPPLIES or debit my ACCESS/BARCLAYCARD No. ______

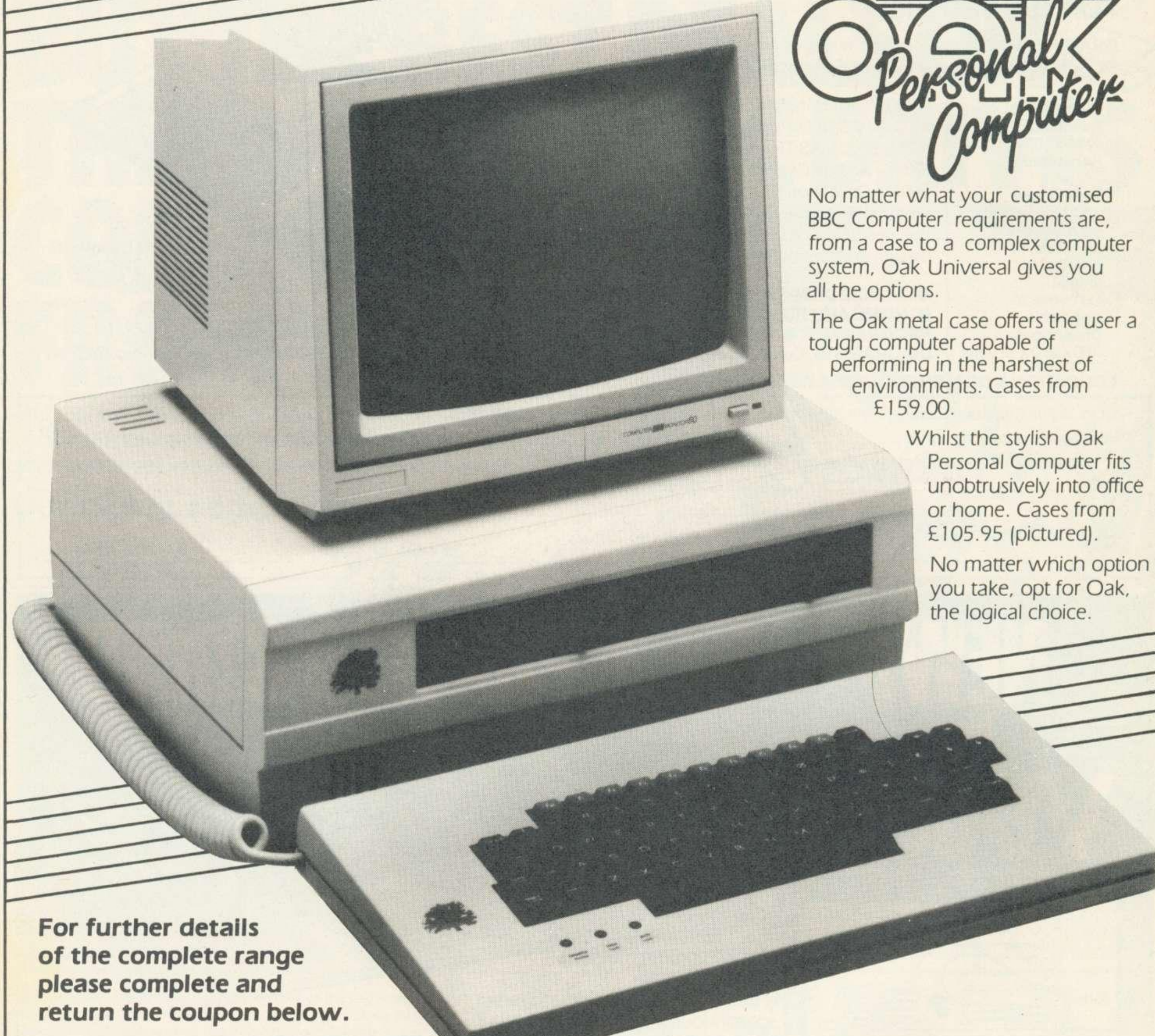
Name ______ Signature ______

Address ______

AU5/6

# BOXED CLEVER

OAK Personal Computer



No matter what your customised BBC Computer requirements are, from a case to a complex computer system, Oak Universal gives you all the options.

The Oak metal case offers the user a tough computer capable of performing in the harshest of environments. Cases from £159.00.

Whilst the stylish Oak Personal Computer fits unobtrusively into office or home. Cases from £105.95 (pictured).

No matter which option you take, opt for Oak, the logical choice.

**For further details of the complete range please complete and return the coupon below.**

**OAK UNIVERSAL LTD**
**20 Crofters Green, Green Lane, Idle, Bradford BD10 8RR**
TEL: BRADFORD (0274) 614167

Please send me more details of the Oak ranges ☐
My main use is:
Home ☐ Business ☐ Scientific ☐ Education ☐
Name ______________________
Address ______________________
______________________
______________________
______________________
______________ Post Code ______________

The Oak and Oak PC ranges can house

BBC Model B
or BBC Model B+ (64K)
or BBC Model B+ (128K)
with BBC power supply
BBC keyboard and speaker
Up to 2 half height disc drives
Disc drive power supply
Ram Rom expansion boards

Plus a choice of options
65 watt power supply
or 100 watt power supply
10mb or 20mb Winchester Hard Disc
Fan
Modem
IEEE Interface
Co-processors: Z80
6502
32016
68000

**OAK UNIVERSAL LTD**
**20 Crofters Green, Green Lane, Idle, Bradford BD10 8RR**
TEL: BRADFORD (0274) 614167
All prices shown above are exclusive of VAT

# BUSINESS

## NEWS

### Beeb's Swift spreadsheet

Audiogenic Software has converted its *Swift Spreadsheet* package to run on the Beeb. The software sells at £29.95 and comes on an EPROM.

It uses pop-up menus to allow easy access to the spreadsheet's commands and offers a sheet area of 3200 cells.

Other features include flexible cell formatting and a bar graph display option.

Contact Audiogenic Software on (0734) 303663.

### Manager for 128

Contex Computing has released a version of its *Bank Manager* financial management package for the BBC 128.

It eliminates the disc overlaying necessary with the model B version by storing all the program in the 128's sideways RAM.

The price is £21.50, or £5 to users who return the old version to Contex Computing. Tel: (02303) 347.

## Beebs go to press

*by Geoff Nairn*

Top British newspapers are looking at using BBC micros to replace their trusty – but rusty – Remington typewriters.

Over 90 representatives from provincial and national newspapers, including the *Daily Express* and the *Financial Times*, were due to attend a meeting of the Web Offset Newspaper Association (WONA) in Maidstone on March 18, where a BBC micro was being used to help produce a newspaper.

Mike Barnes, a typesetting consultant, was to show off his £1600 system, which consists of a modified Beeb and some typesetting software, hooked up to a phototypesetter.

This allows stories entered at the keyboard to be quickly turned into a forme – a photographic negative – ready for the printing presses and is cheaper than both the traditional hot metal process


TODAY
25 years of Survival
Budget plan to beat the burglar
SEX FIEND CLEARED OF MURDER
Jurors weep as his record is revealed
Recovering the Challenger
The grim shuttle task

**Today: gone for the new technology**

and dedicated computer terminals, said Mike Barnes.

A special newspaper was produced using his software at the Newstec exhibition last year (see page 9, *Acorn User* February '86) by journalists from the *Kent Messenger*. The *Kent Messenger* is hosting the WONA conference and has a BBC micro of its own 'knocking around somewhere', according to a spokesman.

Many provincial and national newspapers, including *The Times* and *Today*, have already plumped for new technology, but the idea of using cheap microcomputers is new and, according to Alan Shanks, secretary of WONA, it could revolutionise the industry.

He said: 'Dedicated systems, which cost £24,000, can be replaced by £5000 computers or wordprocessors.

'Newspapers will be able to set up anywhere with just a wordprocessor and a local instant print shop.'

Eddie Shah, proprietor of *Today* and a member of WONA, recently invested heavily in dedicated – and expensive – computer production equipment.

### Pinched

But already the writing is on the wall, for BBC micros are used by two *Today* contributors to send in copy over the phone lines. Apple and Tandy micros are also used at *Today*.

Chris Curry, co-founder of Acorn Computers, has pinched 12 former employees who helped build the Acorn Communicator – including the two bosses – and has set up a new company, General Information Systems (GIS), at Croxton Hall, his Cambridgeshire country manor.

He is understood to be developing the Communicator for use as just such a newspaper production tool, though Ramanuj Banerjee, former technical manager of the Communicator project at Acorn, would not comment on the proposed activities of GIS.

## Scottish bank breaks into market

The Bank of Scotland is looking to break into the English market using its electronic banking service, HOBS, as a spearhead.

The service, launched last year, was originally aimed at micro-owning private customers but was revamped for businesses.

It allows them, by using a micro or Prestel terminal, to pay suppliers, transfer money from current accounts to interest-bearing investment accounts, obtain statements and, by showing cleared balances, project their cash positions.

A Bank of Scotland spokesman told *AU*: 'The level of interest in the service has been very encouraging, certainly in the thousands, but it's too early to say how many people will actually sign on the dotted line.'

### Foothold

HOBS allows the Bank to gain a foothold in the booming English retail banking sector, and is certainly cheaper than the more conventional way – buying High Street sites.

The Bank said: 'There are too many players in the Scottish banking market, so we decided to expand South of the border, where the Big Four (main UK clearing banks) have had the market to themselves for too long.'

HOBS – Home and Office Banking Service – is available to domestic customers for £5 per month – plus Prestel and telephone charges. The full money management service for businesses costs £20 per month. A Prestel adaptor is available for £90, but most of the customers using HOBS to date had their own.

A similar service, run by the Midland Bank, has been particularly popular with Beeb owners.

# ★ CP/M SOFTWARE & SUPPORT FROM DRA ★

## POCKET PROSTAR SUITE £149.00

Includes Pocket WordStar, Pocket CalcStar, Pocket DataStar and Pocket ReportStar—PLUS the DRA independent Pocket ProStar Guide. Available for Amstrad 8256 (or 6128 with 2 drives), BBC Z80, etc.

- ★ MicroPro's integrated family of software programs
- ★ Pocket WordStar for word processing and mail merging
- ★ Pocket CalcStar spread sheet for calculations, projections and analysis
- ★ Pocket DataStar database filing and retrieval system
- ★ Pocket ReportStar the powerful report generator and data sorting program
- ★ Pocket ProStar Guide for the complete beginner to the most experienced MicroPro user
- ★ Support from DRA—the MicroPro software experts

Using the MicroPro Pocket programs and the Pocket ProStar Guide, you will be able to design complete systems for your small business, professional practise (e.g. medical, legal), for office administration, or for education at all levels from primary school business/computer studies to university research departments. The MicroPro reference manuals are available at extra cost.

## FREE SOFTWARE HANDBOOK PLUS 70 PROGRAMS ON DISC

5.25" disks/book set £35.00

3" disks/book set £39.95

- ★ CP/M and PC DOS/MS-DOS Editions available
- ★ A comprehensive selection of favourite Public Domain programs—with excellent documentation in the form of the Handbook
- ★ Chapters on Family Fun, Directory Assistance, Useful Utilities, Libraries and Catalogues, Communications, and a Hacker's Toolbox.

Send Cheque (or VISA/ACCESS number) to:

**DAVIS RUBIN ASSOCIATES LTD**

1 Canonbourne, Weston sub Edge, Glos. GL55 6QH

VISA/ACCESS orders: TEL (0386) 841181 All prices include VAT and Postage

★★★★ SEND FOR OUR FULL LIST ★★★★

# contex computing




**BANK MANAGER (disc only)**

Manage your personal accounts with ease. Enter cheques and receipts. Standing orders any frequency. Automatic date sequencing. Reconcile statements. Search, amend and delete. Unreconcile. Move forwards or backwards. Analyse expenditure. Forward cash flow forecast. Up to 36 simultaneous 'bank' (bank, credit cards etc) accounts, 9999 standing orders, 99 analysis categories, 12 actual and 12 budgets per category, over 4,000 postings on an 80tk disc. Reports to screen or printer. Graphics. Foreign currency support. Password. File recovery. Auto exec file. Field editing. Itemised look ahead. Programmable report writer.

For BBC, BBC+ and Master, disc **£17.50**

Special version utilising extra BBC+128 & Master features, disc **£21.50**

Optional 'business utilities' adding double entry trial balance report and programmable speadsheet analysis report, disc **£10.00**

**TYPING TUTOR**

Quickly learn to touch type. Over 90 smoothly graded lessons graduate you from the basic home keys to complete keyboard mastery. Unique word scan line checking. Target WPM and percentage correct. You may revise the targets or change the lessons as required. Audio key click for positive key depression. Establish a typing rhythm using the automatic metronome. Free format option. Recommended. For BBC, BBC+ & Master.

**Cassette £9.50  Disc £11.50**




**SPREADSHEET Mk V** (disc only)

The spreadsheet with input and printing command languages. Hundreds in use. We believe this is the most versatile disc based spreadsheet offering many more facilities than much more expensive packages. Models up to 1,000 cells and very easy to use. For BBC, BBC+ & Master, disc **£17.50**

As an additional service to the serious business user we can also supply

| | |
|---|---|
| **Acornsoft Viewstore** – very powerful database ROM | £54.00 |
| **Acornsoft Viewsheet** – fast multi window spreadsheet ROM | £54.00 |
| **Acornsoft View V2.1** – super 40/80 col wordprocessor ROM | £54.00 |
| **Acornsoft Printer driver generator** – for View and Store | £11.50 |

ALL PRICES FULLY INCLUSIVE. FREE POSTAGE WITHIN UK.

**Enquiries and Acess credit card orders telephone 02303 347**

**CONTEX COMPUTING 15 Woodlands Close, Cople, Bedford MK44 3UE**

Please rush me .......... ☐ cassette ☐ 40tk ☐ 80tk ☐ ROM

Enclosed £ or debit my Access card no ..........

Name ..........

Address ..........

FAST DELIVERY

AU5 AA140

NEW MICRO-MAILER

A LOW COST DISC BASED

# PROFESSIONAL ACCOUNTING PROGRAM

For The BBC Computer

## " Micro-Trader "

**INTEGRATED SALES PURCHASE AND NOMINAL LEDGERS**

Designed for business use by a business man. " Micro-Trader " Sales and Purchase Ledger Transactions are updated to the Nominal Ledger.

" Micro-Trader " offers full Sales and Purchase Ledger facilities including SALES INVOICE and STATEMENT PRINTING with a capacity of 450 accounts and 3000 transactions per month in each Ledger.

Normal Income, Expenditure, Assets, Liabilities & Journal Posting in the Nominal Ledger with full Reporting for individual accounts, Audit Trail, Trial Balance, Profit & Loss and Balance Sheet.

**"MICRO-STOCK"**

Stock Control program, fully integrated with "Micro-Trader". 4000 Stock Items with user defined Codes. Invoice and Credit Notes and Cash Sales routine. Full Stock Held Reports.

**£95.00 + V.A.T.**

ONLY £200 + V.A.T.

NEW MASTER SERIES COMPATIBLE

**NEW "MICRO-MAILER"**

A Mailmerge program, fully integrated with "MICRO-TRADER" With a user Database.

**£45.00 + V.A.T.**

PHONE TODAY FOR A FREE FACT SHEET

# MEADOW COMPUTERS

11, LONDON STREET, WHITCHURCH, HAMPSHIRE, RG28 7LH

**Telephone: Whitchurch (025682) 2008**

# BUSINESS

## NEWS

## One-to-One starts battling

The battle for electronic mail customers hots up as One-to-One cuts its charges and expands its services.

One-to-One is one of the four main e-mail suppliers fighting it out in the UK – each with incompatible services. The others are Comet, Easylink and market leader Telecom Gold.

One-to-One has dropped individual message charges – previously 5p or more – for its 6000 subscribers and has added a viewdata port, allowing those with Prestel terminals to use the service. There is still a time charge of 10p per minute and a £50 one-off charge for each mailbox.

It has also added a noticeboard, 121World, where 'for sale' notices and general business information can be posted free of charge.

The changes are an attempt to reach large corporate users, where One-to-One has been under-represented; most of its customers are small businesses, using the service to provide low-cost access to the much larger Telex network.

### Rivals

British Telecom was unimpressed with its rival's moves and its Telecom Gold tarifs stay the same – higher than One-to-One's. Instead BT hoped that its recent commitment to the X400 technical standard for e-mail would get customers signing up.

Telecom Gold MD, Peter Burry, said: 'X400 is the most significant development in electronic mail and we will see the first practical implementations of the standard later this year.'

Telecom Gold tarifs are: up to 11p per minute useage charge, 20p per month storage charge for the equivalent of a side of A4, and a £300 subscription for corporate customers, allowing unlimited mailboxes. 'Club users' pay only £40 per mailbox.

# Video from Ivan Berg

*by Geoff Nairn*

Ivan Berg Software is the latest contender in the interactive video market with a tape-based BBC micro system, the Take Five.

Aimed squarely at industrial training applications, the Take Five allows material recorded on standard Betamax format video tape to be turned into an interactive training course with question-and-answer frames supplied by the BBC micro.

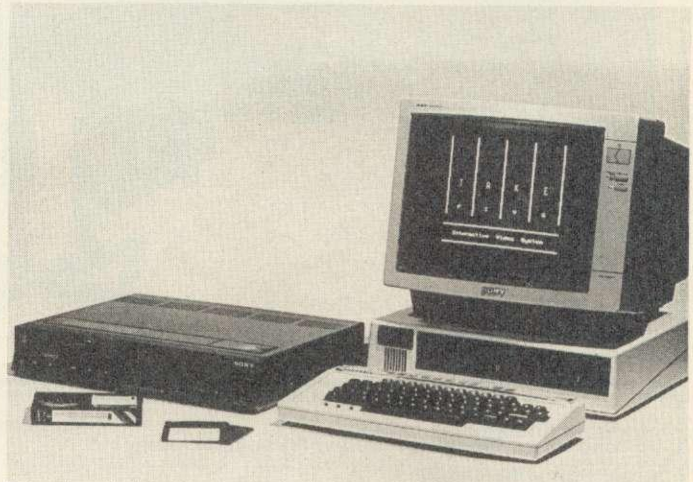
The Take Five systems costs £2933 which includes a modified Beeb with dual disc drives, a Sony colour monitor and a Sony Betamax recorder – though U-Matic is available as an option.

Acorn spurned video tape and went for a Philips videodisc-based system for its attempt to conquer this burgeoning market. Such systems require purpose-made video discs and cannot record.

The Acorn system, called Master Video, now features a Master 128 and a Philips or Pioneer laser disc player, and sells for £3220. There is also a more compact version for £3750.

Acorn Video, a subsidiary of Acorn Computers, claims to have sold 30-40 video systems, mainly for commercial training and point-of-sale applications.

However, to date, few large customers have placed repeat orders after buying an initial trial machine from Acorn, and Lloyds Bank, looking to buy 1500 machines for staff training, rejected their two Acorn machines and chose a dedicated system from Video Logic.



**Take Five: the latest contender in the interactive video market**

### Complaint

One complaint has been that the picture on the Acorn system is unsteady – a complaint traditionally levelled at tape-based systems. Chris Turner of Acorn Video blamed the technical problem and the loss of the Lloyds Bank contract on the turmoil Acorn went through at the beginning in 1985.

He said: 'We just couldn't offer the support or commitment. Now we have every chance of winning such a contract on technical and commercial grounds.'

Acorn was to supply the hardware and software for the BBC-produced video discs in the BBC's ambitious Domesday Project. However, because of Acorn's plight last year, the BBC took over writing the retrieval software, which is stored on the videodisc.

The project has slipped behind schedule but hardware, software and videodisc should be ready for November.

Chris Turner said the company was looking at the possibility of making an IBM PC-based interactive video system, as many of its largest potential customers had a 'buy IBM' policy.

But the Acorn-based machine would not be dropped, he added.

**BUSINESS TOP FIVE**

| | Title | Publisher | Cassette | Disc | ROM | Electron | Shadow on B+ | 6502 | Econet |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Mini Office | Database | £5.95 | £7.95 £9.95† | — | £5.95 | * | * | — |
| 2 | Mini Office 2 | Database | £14.95 | — | — | Yes | * | * | — |
| 3 | Beyond Basic | BBCSoft | £11.50 | — | — | — | Yes | — | — |
| 4 | Wordwise | Computer Concepts | — | — | £56.35 | — | — | — | — |
| 5 | Wordwise + | Computer Concepts | — | — | £56.35 | — | — | Yes | — |

Compiled by Gallup/MicroScope. * Contact publisher: Database Publications, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY. BBCSoft, 35 Marylebone High Street, London W1M 4AA. Tel: 01-580 4468. Computer Concepts, Gaddesden Place, Hemel Hempstead, Herts HP2 6EX. Tel: (0442) 63933.

† 3" disc

# OPUS WILL MAKE YOU A BETTER ORGANISER FOR ONLY £60



If your micro system is starting to get out of hand a smart organiser could be the solution to your problems.

At just £59.95 the Organiser desk from Opus Supplies will help to organise your system beautifully. It's purpose built to provide plenty of storage space and because it's produced alongside our range of executive computer desking it offers a level of quality you'll appreciate.

Shelving accommodates your monitor, printer computer, disc drive or cassette recorder and software, and the teak-finished unit is fitted with castors to make it fully mobile. The Organiser's assembled dimensions are: H. 31″, W. 40¼″ and D. 26″.

And our price includes VAT and FREE DELIVERY.

The Organiser desk is suitable for use with all leading home micros including the BBC, Amstrad, Commodore and Sinclair computers.

**Getting organised couldn't be easier. Phone us on 0737 65080 or simply post the coupon below.**

To: Opus Supplies Ltd,
55 Ormside Way, Holmethorpe Industrial Estate, Redhill, Surrey.

Please rush me the following:
(PRICES INCLUDE VAT AND CARRIAGE)

________ Organiser Desk(s) at £59.95 each (inc. VAT)

I enclose a cheque for £________ or please debit my credit card account with the amount of £________

My Access ☐ Barclaycard ☐ (please tick) no. is:

Name________

Address________

Telephone________

**Opus.** Opus Supplies Ltd.

55 Ormside Way, Holmethorpe Industrial Estate, Redhill, Surrey.
TELEPHONE: 0737-65080



| | | | |
|---|---|---|---|
| **SOFTWARE** | | Suitable for standard and Master Series computers | |
| | | CASHBOOK Double Entry bookkeeping in RAM | **£13.75** |
| | | CASHBOOK Double Entry random access bookkeeping | **£22.95** |
| | **** | ACCOUNT Double Entry random access bookkeeping with credit control, ledgers and analysis for businesses | **£34.45** |
| | | MAILING 250 names/addresses, label printing for clubs | **£13.75** |
| | **** | MAILING 1100/2500 names/addresses for label printing with mail merge for any wordprocessor for businesses | **£34.45** |
| | **** | PAYROLL system with 1, 2, 4 weekly & monthly, contracted in & out, 3 overtime, personnel file, 2 payslip formats | **£57.50** |
| | **** | SPECIAL OFFER (THREE 4 * programs) | **£69.95** |
| | | FAMILY TREE 250 records for Ancestral, descendant and genealogical tracing with full tree printout | **£19.95** |
| | | STATPACK the stats package for students | **£13.75** |
| **ROMS** | | WORDWISE PLUS | **£42.95** |
| | | CARETAKER UTILITY | **£24.95** |
| | | DISC DOCTOR UTILITY | **£24.95** |
| | | PRINTMASTER UTILITY | **£24.95** |
| | | INTER CHART DATA DISPLAY | **£29.95** |
| | | INTER SHEET SPREADSHEET | **£44.95** |
| **EPROMS** | | 27128 16k | **£2.75** |
| **PRINTERS:** | | CPA-80 + NLQ 100 cps Friction & Tractor | **£189.95** |
| | | CPA-80 cartridge printer ribbon | **£5.50** |
| | | Epson LX-80 100 cps NLQ Friction & Tractor | **£269.00** |
| **PRINTER CABLE** | | Suitable for BBC/Electron to Parallel Printers | **£8.95** |
| **DISC DRIVE** | | Opus twin double sided 40/80 without power supply | **£189.95** |
| **DISCS** | | 5.25″ Double sided double density 80 tracks in box | **£9.95** |
| **CASSETTES** | | C15 boxed in 5's, leaderless, ideal data tapes | **10 for £2.50** |
| **LISTING PAPER** | | Box 2000 sheets 11″ × 9.5″ | **£14.95** |
| **LABELS** | | For Mailing. 1000 3 across 2.75″ × 1.4375″ | **£6.50** |

***Ask for brochure for more software and further details.***

Prices include VAT. Add 50p for Postage & Packing. Discs add 98p

**Micro-Aid**

**(AU),**
**25 Fore Street, Praze, Camborne, Cornwall**
**TR14 0JX**
**or Telephone 0209-831274 with ACCESS**
**or PRESTEL *2582020**

## PAYROLL

Extended Payroll was released last April and was instantly adopted by 50% of our existing Payroll users who knew what they were talking about. After all level headed businessmen don't throw good money after bad do they. Whilst no program is perfect the success of Extended Payroll has proven without doubt that we have got it just about right.

Payroll offers random access disc facilities with either one or more drives and the option to print out payslips or not in two different styles. Even if you have a disaster and your printer breaks down you can still copy the pay by hand. We think about these things because it has happened to us!

There are weekly, fortnightly, four weekly and monthly pay options as well as 3 overtime rates, hourly pay, automatic standard pay, holiday pay, sick pay and bonus pay. All NI and tax codes as well as refunds are catered for. Included in the program is a personnel file on every employee.

Period summaries are printable each pay day and at any time you wish. Automatic P7X form updates are covered and Inland Revenue payment amounts are resettable at the end of each period. At year end all records can be reset for new year use.

An annual update service is offered to enable you to maintain your payroll for £7.50 + VAT.

**BUY NOW AND START THE NEW TAX YEAR RIGHT**

**£49.95 + VAT (Please state disc size)**

AA110

**BUSINESS**

# PROCESSING FROM THE WORD GO

**In this first of an occasional series of articles on wordprocessors and wordprocessing, advice for disc users is offered**

***Jacquetta Megarry***

Most people who use their Beeb for wordprocessing soon find they need a disc drive. For this wordprocessor article, therefore, I'm starting with advice for disc users that applies whether you favour *View, Wordwise, Wordwise Plus, Scribe* or another system.

You'll quickly find that you fill discs faster than you thought possible! Decide your policy on disc management on the following: how often to save and how many backup copies to keep; how often to weed out and tidy up your discs; how to arrange documents on discs and how to keep track; whether and how to use directories (see below); and how to give your files short but meaningful names.

Sooner or later you'll find that a file (or even a whole disc) has been corrupted. How you feel about this will depend on whether it was a long-dead letter or the priceless text of your first novel of which you have no hard copy. If you're sensible about handling discs, you may have no problems for months or years, but Murphy's Law suggests that if you do have a disaster, it will inevitably be to something that cost you blood and sweat to write.

## Basic precautions

The most basic precaution is to save anything important twice onto two separate discs: if one gets destroyed you have a good chance that the backup disc hasn't. If you compose at the keyboard you'll have no other copy of your text, so it's also a good idea to print at least a rough copy before switching off. You should save before you print, as text can be lost at the touch of Break while printing.

Don't wait till you've finished a document to save it: a power cut can wipe everything out. Depending on your habits and system, you may find frequent saves distracting. Personally I save every hour or so and every time I have to break off for a cup of tea.

Don't fall in the trap of storing intermediate versions of the same document. It just uses up disc space and if you're not careful you can waste ages trying to work out which is the current version. Unless you'll *need* a previous version again, overwrite the old with the new by saving it with the same filename. In *Wordwise* and *View* you get no warning that you're about to wipe out the old file: if this causes you problems, lock valuable files using *ACCESS file name L. *Wordwise Plus* checks first with 'Replace old file?'.

It's sensible to weed out unwanted files as soon as you can, as you'll forget what document the filename stands for, and have to load the text back in before deciding to delete it – fairly quick with *View* and *Wordwise Plus*, but slow with *Wordwise*. Use *DELETE followed by the filename unless you're confident of the more drastic ways of deleting files. After a deleting session is the ideal time to tidy up the disc using *COMPACT. Make sure you've saved any text in memory first, though, as *COMPACT will clear it!

You may compose a variety of document types: letters, memos, minutes, address labels, reports, articles, even booklets or books. Perhaps you also store programs written in languages such as Basic, Logo or *WordPlus*. Try to avoid mixing different types of document, or documents with programs, on a disc.

Label each disc clearly with the document type, and resist the temptation to use it for anything else. Record the category name (up to 12 characters) on the disc using *TITLE. For example *TITLE mail_labels1 might title your first address labels disc. Keep a written record of the disc catalogue with the disc. Most systems let you print one in Command or Menu Mode by enabling the printer (which must already be switched on and on-line) with CTRL-B, then *CAT (or *.) and finally CTRL-C to disable the printer.

If you keep different file types on different discs, you may not need to bother about directories. But not everyone finds this easy, and directories are important to enjoy fully the benefits of the Advanced Disc Filing System (as supplied in the master).

A directory is a way of labelling files on a disc so that those which belong together appear together in the catalogue and are easy to copy and delete as a group. Each directory is like a ring-binder labelled with a single character: almost any keyboard character will do, but most people use letters. If you only had one disc for all your files, therefore, you could use the B directory for Basic programs, the L directory for letters, M for memos, R for reports and so on.

To change from the current directory (which is $ by default) to directory R, simply type *DIR R. To return to $, type * DIR $. You can save a file called report1 to the R directory while still in $ by typing its filename preceded by R. – R.report1.

## Clever filenames

Devising a helpful filename within seven characters can be quite a challenge. Clever coding systems can be difficult to crack weeks later, and shortened filenames can be hard to type and remember: 'consons' is a better abbreviation for 'consonants' than 'cnsnnts'. Never include spaces, but you can use hyphens and most punctuation marks if you want (but avoid full stops on networks).

It's worth including the filename as part of a draft document. *Wordwise Plus* users can do this automatically with the embedded command <f1>ps F$<f2>. You can always delete the filename before your final printout.

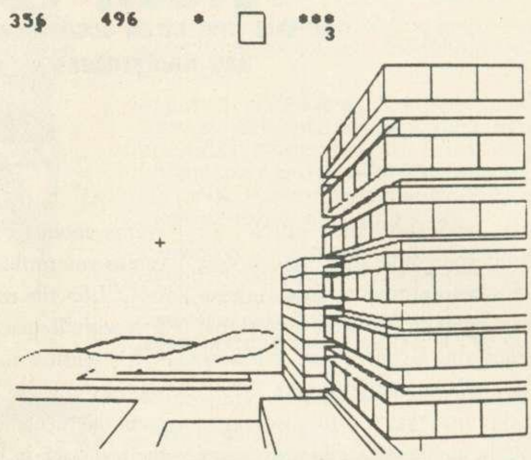
If you want to include the date in a filename, give the month before day so that the files will catalogue in sequence. If you need to include the year, code it (6 for 1986, 7 for 1987) before the month. Thus on May 8 I might save a letter as jm60508 while tomorrow I might use jm60509, and so on. Avoid using numbers at the beginning of a filename, especially in *Wordwise*, as it's easy to mix them up with the menu numbers.

If you've got a Master 128, you've already got *View* built-in, and documentation of a kind is given in the Welcome Manual. One of many things it doesn't tell you is how to access the real-time clock/calendar (CTRL-T for time, CTRL-D for date) within *View*.

And if you still prefer *Wordwise* to *View*, you need *Wordwise Plus* version 1.4D or later, distributed as standard since around January 1986 (contact Computer Concepts if you need to exchange versions). Since *WORD selects *View*, you'll need to type *WORD. (or *WORDWISE) to get *Wordwise Plus*. Wouldn't it be lovely if Computer Concepts seized the chance to do a cheap disc version of *Wordwise* to run in sideways RAM?

# Draw with the BBC micro
## and show the true potential of your machine

Fill shapes in one of 23 colours (Mode I)
Draw points, lines, rectangles ellipses and circles
Smooth curves
Wire frame diagrams
Hidden line removal
Draw in perspective
Measure scaled distances
Ekta sketch lines, Half tone facility
Mirror images
Repeat images, SS, enlarged, reduced, stretched
Actual colour displayed
Store up to 10 ellipses or circles in memory
Redraw any one of these at cursor position
Change any actual colour for one of 8 others
Clear screen, load screen, save screen
Print characters or numbers at any pixel point
Error messages for incorrect input
Fully comprehensive manual



ab designs

**This programme has been purpose designed by professional Graphic Designers for simplicity and ease of use, and is undoubtedly the most versatile drawing programme on the market at this time. There is no need to input any numerical data, as all judgements are made visually. The BBC Micro is the finest drawing machine in its price range. Find out what it can do.**

The A. B. Designs drawing programme costs only £36 for over 70 functions (model B). New AB2 Program, available on disc (price £61) and cassette (price £51). When ordering send Cheque/PO and VAT at 15%. Please include phone no. with all correspondence. For further information send SAE and phone no. to A. B. Designs, 81 Sutton Common Road, Sutton, Surrey. 01.644 6643 (closed all day Thursday).

# In the field of TAPE to DISC transfer we don't need to blow our own trumpet!

These comments from some of our customers will be enough to convince BBC 'B' disc users that the Replay System is worth more than a second look.

**"Congratulations on REPLAY, it works magnificently"**
B.B. Southampton.

**"an excellent product at a reasonable price."**
D.K.A., Cheshire.

**"I am very, very impressed by the power of the ROM, and the ease of use it gives."**

**"I find the REPLAY ROM to be a must for anybody who takes computer games seriously."**
D.R., Hereford.

**"the REPLAY ROM is a remarkable facility."**
A.J.P., London.

**"I was pleased with the T.D.ROM but REPLAY is terrific."**
V.M., Kent.

**"All my tapes have been effortlessly transferred to disc and work well; the pause and update facilities are excellent."**
T.G.B., Cheshire.

**"Congratulations on a superb product. For my book it's the best utility I've seen for the 'Beeb'."**
C.E., Liverpool.

**"we have transferred over 60 cassettes with no problem at all even though we were completely new to disc-drive methods."**
W.B., Bolton.

**"A marvellous addition to my system."**
P.B., Ashford, Kent.

**– and to anyone wondering about our service, may we add the following: "If only other firms were so efficient!!"**
Lt. Cdr. M.W., Middlesex.

**"Your service will not be forgotten."**
D.H.C., Derby.

REPLAY FACT FILE

REPLAY is a Hardware/ROM-based system, the unit can be easily installed without soldering, though if you have a ROM expansion board make sure that the REPLAY ROM can be fitted into one of the computer's own sideways ROM sockets.

With REPLAY installed games can be stopped and saved directly to disc at any time.

REPLAY can load back a stopped screen from disc ready for printing out with a suitable 'printer dump' routine.

Liven up your games with REPLAY: Different background colours: Infinite lives: Hyperspeed: Extra gears: Edit the improvements working from the data sheet supplied.

REPLAY can 'pause' games which do not have this facility built in, and is also able to offer most disc to disc transfer.

The REPLAY System is intended to provide a facility for indivi l users, resulting discs are not recognised by a different computer.

Further details and copies of reviews can be supplied on request.

REPLAY is available for the BBC 'B' with O.S.1.20 and fitte vith the following DFSs (State type when ordering).

R8271 Acorn and other 8271 Single density DFS
R1770 Opus 3.45 and Solidisk issue 1.
R1770A Acorn 1170 DFS or ADSF Solidisk Issue 2
R1770B+ for BBC B+ only — R8272 UDM DFS
R1770C Opus Challenger 3. — R8877 C ana QFS.
R2791 Opus 3.15 only — R2793 Op 3.35 only

Price £35.00 incl VAT and post

Available by post from:
VINE MICROS, MARSHBOROUGH, NR. SANDWICH, KENT.
Post Code: CT13 0PG. Telephone: 0304 812276.
Or through your local dealer.

REPLAY by Vine Micros

AA102

## CARE ELECTRONICS

UNIT 14, PEERGLOW INDUSTRIAL ESTATE, OLD'S APPROACH,
WATFORD, HERTS TELEPHONE: 0923 777155

OPEN
9am-5pm MON-THU
9am-4pm FRI-SAT

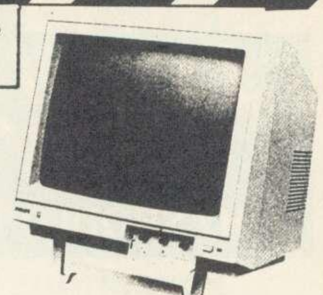
ALL INC VAT

**HAVE YOUR 14" & 16" PHILIPS, PYE or FERGUSON TX COLOUR TV CONVERTED TO A TV/MONITOR RGB CONVERSION KIT @ £46.00**

- ★ Resolution better than 585 x 450 pixels.
- ★ Image clarity comparable to leading montors.
- ★ Includes RGB lead for connecting with BBC.

**REMOTE AND STANDARD TV'S MODIFIED IN OUR FACTORY @ 69.00c**

**MONO**
85/80 Character
Anti-glare Screen
High Resolution
Green Model BM7502 @ £83.95a
Amber Model BM7522 @ £85.10a
LEAD SUPPLIED (FREE)



**TV/MONITORS**
Full 80 characters
14" CF1114 @ 205.85a
16" CT2016 @ 266.80a
16" CT2206 @ 302.45a

**Power Supply Units for Disc Drives**

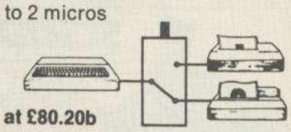
- ★ Colour finished to match BBC Micro.
- ★ Comes complete with moulded mains lead
- ★ 6 pin BBC Outlet or Dual power leads for disc drives. (Please specify when ordering).

**High Rated @ 35.65b Inc VAT**

**Changing Leads is a thing of the Past!**
**COMPUTER/PRINTER SELECTOR 'T' SWITCHER**

- ★ 26 pin as BBC ★ printers to 1 micro
- ★ 1 printer to 2 micros

**ONLY £37.95d Inc Lead**
**6 to 1 version at £80.20b**



**THE CARE LOW PROFILE SYSTEM** gives you the flexibility to plug in any ROM/EPROM for example: View — Toolkit — Wordwise etc., without having to re-open your BBC micro every time you want to change your ROM/EPROM.

**SPECIAL OFFER SUPER LOW PRICE**



Our cartridges and systems are totally compatible with the Viglen systems

RS423 SWITCHER
★ 2 to 1
@ £23.00d

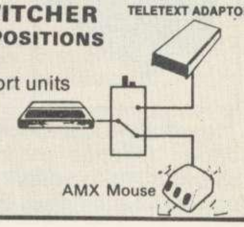
**READYMADE LEADS:**

| | |
|---|---|
| RGB 6 pin DIN | @ 2.99c Inc |
| RGB 6 pin to 7 pin DIN | @ 4.14c Inc |
| RGB 6 pin to SCART | @ 7.82c Inc |

**USER PORT SWITCHER**
**THREE SWITCHED POSITIONS**

- ★ 20pin as BBC
- ★ 1 micro to 2 user port units

**ONLY £37.95d Inc LEAD**




- ★ Complete Module System @ £10.81d
- ★ **Spare Cartridge @ £2.07c each**
- ★ Library Rock to store 6 Cartridge @ £1.84c

**HOW TO ORDER:**
By Post. Enclose your Cheque/P.O. made payable to **CARE Electronics.**
Or use your ACCESS. Allow 7 days for delivery. Please add carriage.
ALL INC VAT a) = 10.00 b) = 5.00 c) = 1.00 d) = 2.00

---

New product

## THE MATRIX ROM
### ENGINEERS, MATHEMATICIANS, SCIENTISTS and STUDENTS

**Do your programs involve numerical calculations? The MATRIX ROM may alter your life!**

If your calculations require the solution of equations, or if they involve the handling of matrices, (especially inversion), then the MATRIX ROM will provide you with simple commands to do all the work. Commands which can be used freely within BASIC programs, and will take over all the number-crunching jobs at high speed in machine code.

If your available memory is bursting at the seams, you can gain enormous benefits by deleting unwanted arrays. You can even re-dimension and swap the names of arrays while the program is running.

Many other commands are provided to carry out all the usual operations of matrix algebra, and much else besides. It will no longer be necessary to write many lines of tedious BASIC in order to do matrix calculations, or to solve equations.

The MATRIX ROM will do it all – in a fraction of the space and time.

Written with the co-operation of The Civil Engineering Department, University of Southampton

Suitable for the BBC 'B', 'B+' and ELECTRON computers
£36.00 plus VAT, post paid
(Price includes comprehensive Manual)
Quantity discount offered to Educational Establishments

For further details or supply contact:
**VINE MICROS, MARSHBOROUGH, NR. SANDWICH, KENT, CT13 0PG.**
**Tel: 0304 812276**

VISA — Vine Micros

---

## PRICES PER BOX OF 10 DISCS
## ALL DISKETTES ARE GUARANTEED

| 5.25" Diskettes | 40 TRACK SS/DD | 40 TRACK DS/DD | 80 TRACK SS/DD | 80 TRACK DS/DD |
|---|---|---|---|---|
| STORAGE MASTER | £13.50 | £16.00 | £18.00 | £21.00 |
| NASHUA (Lib. Cased) | £14.00 | £16.50 | £18.50 | £21.50 |
| MAXELL | £16.00 | £20.00 | £20.00 | £23.50 |
| UNLABELLED | £ 8.00 | £10.00 | £11.00 | £11.50 |

3.5" Diskettes, popular brand names eg. Storage Master, Nashua, Maxell and Sony are also available at very competitive price.

| HITACHI EPROMS | (BBC COMPATIBLE) | | |
|---|---|---|---|
| 2764-250ns | £2.50 | 8271 | £39.50 |
| 27128-250ns | £3.00 | | |
| 27256-250ns | £5.50 | 6264LP-15 | £3.80 |
| 27C256-250ns | £7.50 | | |

Same Day Despatch
All prices include VAT & P & P

**FLORA ELECTRONICS**
**14 LEVER STREET, PICCADILLY, MANCHESTER M1 1LN**
**TEL: 061-228 3553**

AA167

---

## LOGIC ANALYSER SOFTWARE

**Designed for Industrial, Research, Educational and Hobby use. An easy-to-use software package to turn the User Port of the BBC computer into a powerful 8 channel LOGIC ANALYSER**

Ideal for setting-up, fault-finding or monitoring machinery operations, pneumatic systems, electrical and electronic logic circuits and control systems. Invaluable for any real-time application where you need to establish the sequencing of any events which can be monitored by logic levels, or by signals from suitable sensors or switches.

- ★ Selectable sampling intervals from 13 microseconds to 10 seconds, (80 KHz to 0.1Hz).
- ★ Continuous sampling time of 35 msec to 8 hrs on BBC B; ¼ sec to 65 hrs with SHADOW on B+.
- ★ Flexible selection of start and finish trigger conditions on all channels.
- ★ Fully selectable logic combinations 'marked' to aid analysis.
- ★ High resolution 'logic oscilloscope' type display, with flexible data review facilities.
- ★ Captured data can be saved to disc, in full or part, and recalled for further analysis.
- ★ Optional OPTO-ISOLATED INTERFACE available; Protects the BBC from incorrect connection to industrial/laboratory signals.

**QCS LOGIC ANALYSER SOFTWARE £24.75**
**QCS LOGIC ANALYSER INTERFACE £34.50**
**SPECIFY: 40/80TDISC OR TAPE**

Send cheque or PO with order (price inc p&p), or write/telephone for further details.

**QUERCUS COMPUTER SYSTEMS**
**Courtyard House, North Otterington, Northallerton, North Yorks DL7 9EP. Tel: (0609) 70643**

# INFORMATION PROCESSING ON YOUR BBC COMPUTER!

## WHY SHOULD THE BIG BOYS GET ALL THE INTEGRATED SOFTWARE?

## For serious users of the BBC computer. Disc machines only.

What the reviewers say:-

*DATASCRIBE IS BRILLIANT VALUE FOR MONEY—*

John Vogler, A & B Computing, Sept 1985.

*I SHALL USE SCRIBE FOR MOST OF MY WRITING—*

John Dawson, Your Computer, Feb 1985.

## SCRIBE £39.95



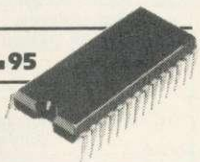

THE PROFESSIONAL WORD PROCESSOR designed for the serious user * All operations fully prompted * No special knowledge of the computer system necessary * Document size NOT limited by computer memory * Automatic disc buffering ensures text is moved between disc and computer memory without user intervention * Up to 255 pages in a single document * 80 column display * On screen underline and right justify * See it as it will be printed. SCRIBE comes in a chip with 5 minute fitting instructions, utilities disc and manual. Integrates with Database.

## DATABASE £49.95




A superb record keeping system with an incredible operating speed. 96 fields per record * One record 2 Kb max * One field 900 characters max * 4000 records per database * 16 level conditional search * Record match * 8 automatic sub indexes * Total flexibility of output via report writer with ability to write back to the database * Maths pack * Semi programming language plus compiler. Integrates with Scribe to give conditional search with MAIL MERGE and high powered report formatting. Comes in ROM.

## DATASCRIBE £69.95



Scribe & Database in a single chip! Contains all the features of both products and with an attractive saving on price and ROM space.

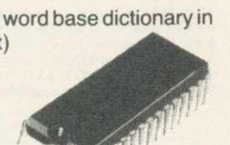
## DOUBLE-DOS £45



Double density disc interface. A high capacity database or word processor is enhanced even further with this state of the art disc interface. The many features include * 720 Kb of CONTINUOUS file space on a standard 80 track disc drive * Automatically read standard Acorn files * Compensate for discs formatted in single density * Provide up to 159 files IN ONE DIRECTORY * Automatically read, write and format double sided drives to appear as one disc surface * Allow maximum use of MERTEC Scribe and Database. Very easy fitting — no soldering — full instructions provided.

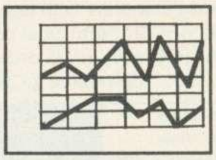
## SCRIBECHEC £24.95

### TYPING/SPELLING CHECKER.



The fastest typing checker available. * 7200 word base dictionary in ROM plus room for your own 15,000 (approx) word dictionary on disc * Any number of dictionaries * Maintenance includes add and aelete, list words between alpha limits and many more features * Check speed 1500 words per minute! * Any document length. Also available for wordwise & view.

## DATASTAG £49.95



**STATISTICS AND GRAPHICS PACKAGE. (ROM BASED)**

Coming soon. A highly professional system which integrates with Database. Allows you to store your data in any format and, using Database, present all or selected items of data for graphing and statistical analysis * Graphs include Pie, bar, histograms, line plot, scatter plot * Display between one and four graphs simultaneously * Automatic scaling and direct digital readout of graph co-ordinates * Statistics include all standard tests plus linear regression and correlation etc * seven non-parametric tests * Epson screen dump included with facility to add your own printer dump.

## MINI ROM BOARD £14.95

Provides four extra ROM sockets. Easy fitting and without any of the overheating and space problems associated with large expansion boards. *FOR BBC MODEL B ONLY*

## *SPECIAL COMBINED PACKAGE OFFER*

Datastag & Database (in one chip) ☐ **£69.95**

### NEW MERTEC TITAN CHIP FOR THE BBC MASTER 128

*SOON*

**Six integrated packages with one chip! £95**

WORD PROCESSOR — DATABASE — STATISTICS — GRAPHICS — SPELLING CHECKER FOR VIEW — SPELLING CHECKER FOR SCRIBE

**TITAN USES THE ADFS AND REQUIRES A DUAL DISC DRIVE.**

**BBC MASTER NETWORKING ENQUIRIES WELCOME**

**Prices include VAT. Add 60p post and packing to your order. Discounts on Dealer and education application**

Mertec

MERLIN COMPUTER PRODUCTS

Please supply the following products/information. Please tick box.

| | | |
|---|---|---|
| SCRIBE ☐ | QTY ______ | £ ______ |
| DATABASE ☐ | QTY ______ | £ ______ |
| DATASCRIBE ☐ | QTY ______ | £ ______ |
| DOUBLE DOS ☐ | QTY ______ | £ ______ |
| SCRIBECHEC ☐ | QTY ______ | £ ______ |
| DATASTAG ☐ | QTY ______ | £ ______ |
| TITAN ☐ | QTY ______ | £ ______ |
| MINI ROM BOARD ☐ | QTY ______ | £ ______ |
| | TOTAL | ______ |

I enclose £ Inc P&P

My credit card No. is

Visa ☐ Access ☐ Tick which

Name ______

Address ______

To **MERTEC COMPUTER PRODUCTS**

33/36 Singleton Street, Swansea SA1 3QN. Tel: 0792 467980

**IMPORTANT NOTE:** Please check with us if you decide to use any other disc interface than Acorn or Double-Dos with Scribe or Database.

# ACORN FORUM

**In this forum for owners of Acorn micros, Mike Barwise concludes his series on discs and a daisywheel screen dump is presented**

## KEEPING TRACK OF THE DISCS

From the point of view of performance, the most interesting feature of the IBM format for discs is the sector numbering (see last month's Acorn Forum). Sectors are usually numbered consecutively within a track, and in the Acorn system they are numbered zero through nine.

However, it isn't obligatory to start each track with sector zero; in fact, just numbering the sectors of each track zero through nine starting at the index hole each time would lead to a very inefficient system.

This is because of the relationship between the drive head stepping time and the time taken for a sector to pass under the drive head. Assuming the sectors are evenly disposed throughout the track (they are not, but the discrepancy is very small in Acorn format), each sector takes one tenth of a revolution at 300rpm or 20 milliseconds to pass under the drive head. The head step time varies from drive to drive between three and 30 milliseconds, and there is an additional settling time of between 12 and 45 milliseconds to allow for vibration due to the inertia and elasticity of the head stepper mechanism to die away.

### Painfully slow

Assuming a mean case of a 12ms step and 12ms settling time (24ms total), we read our first track. Having read sector nine, we step the head to the next track. Sector zero must be read first, but we have taken 24ms to get to the track. As sector zero started effectively on the same radius as sector nine finished, we now find that sector zero has gone past, and so has part of sector one. The remaining four-fifths of a revolution must now take place before sector zero comes under the drive head again, so the real time between reading tracks is about a fifth of a second (200ms) instead of 24ms.

If we are clever during formatting, though, and start numbering our sectors on the second track from number eight at the index hole, through nine, zero, and so on, the correct sector will be just about to pass under the drive head as the step and settling time end. This is the concept of 'sector stagger'. Every track from one onwards starts at its index hole with a sector number which is n less than the previous track start sector.

Ideally, stagger should be fine-tuned to an individual drive step rate and settling time. However, this would oblige the user to stick with a given drive system and with discs formatted on that system, or pay a heavy penalty in loss of efficiency. Acorn has again come up with an excellent compromise. The Acorn stagger of minus four (stagger should always be expressed as minus something) allows step-plus-settling totals of up to about 75ms to be accommodated. This covers most low-cost new systems and practically all old full-height drives. With really classy units like half-height Teacs, it's possible to reduce the stagger to minus three or even minus two, provided the step rate of the floppy disc controller chip (FDC) can be set to match the optimum drive step rate. The performance increase is quite dramatic, with a trade-off of limited interchangeability. If in doubt, too much stagger is better than too little.

Of course, there is no way of tuning the stagger so that the first sector matches the first track of your file after the primary seek form the disc catalogue. The best you can do is set up your system to match the drive step rate as nearly as you can so this seek is as fast as possible. BBC micro users should set the links or DIP switches along-side the keyboard to suit the slowest drive in the system. Atom users with Disc Packs really have no control, as the step rate and settling time are coded as literals in the DOS. Bear AFDC users can set up the step rate for each drive individually, but the settling time is fixed at 30ms.

Now that the basics of the ID structure have been explained, we move on to how you can play with discs at the sector level.

All IBM-standard FDCs have certain things in common. They all expect you to provide them with a track number, a sector number, and an opcode telling them whether to read or write. The architecture of different chips varies, so the syntax will vary too, but fortunately we have to deal with just two alternatives: the Intel 8271 and the Western Digital family. Various independent FDCs for the BBC micro have used different members of the WD family, but their command structure and codes are practically consistent, so these notes apply to the 179x series, the 279x series and the 1770.

The Intel 8271 has a command/status register, a general parameter/result register and a data register. Commands are sent by writing the opcode to the command register while the FDC is not busy, followed by a variable set of parameters to the parameter register. There is a fairly involved initialisation sequence to be performed on start-up or after reset, as all the drive parameters and some parameters not used on Acorn systems must be loaded into the FDC by a 'specify' command. This makes working outside a DFS rather cumbersome. Parameters for data-processing commands always include the track and sector number so that a single opcode performs the seek and the read or write operation. Any errors are reported in the result register. The data transfers are performed through the data registers (read or write) – on Acorn systems, the data transfers are synchronised by use of the NMI interrupt.

Features unique to the 8271 include a 'fixed-length key scan data' operation and a 'read IDs from track' operation.

The Western Digital FDCs have a much simpler architecture and command structure. There are four read/write registers: command/status, track, sector and data.

### Information on errors

The standard syntax is: load track register, send seek opcode, wait for completion, load sector register, send read or write opcode. Data are then presented through the data register in the relevant direction, and on termination the status register provides information on any errors. The WD series allow the user to read the first encountered ID after the index hole on any track, and also to dump an entire track to memory including all gaps, ID headers and CRCs. This allows corrupt discs to be recovered if you know how. Remember that you will need about 3200 bytes in single density and abut twice this in double-density in which to store the data.

Details of all these commands can be found in the manufacturers' data sheets, which should be studied carefully. If you don't understand what you're doing, you can do a lot of damage to your data by thumping around at sector level because there's no error protection. However, once you have taken the plunge, data can be stored on discs without catalogues by the simple method of saving it up in a 256 byte buffer and sending it to specified sectors. The Acorn 10-sector track lends itself to working in decimal numbers, as the track and sector can be calculated directly

WEST GLAMORGAN
INSTITUTE OF HIGHER EDUCATION

# Teach Computing

Secondary schools and colleges badly need teachers to teach computing and mathematics. We offer a BEd (Honours) degree in *Computer Science and Mathematics*. Successful completion of this 4-year course means an Honours degree and Qualified Teacher Status.

Study for a BEd – THE degree for teaching. Why not ask us for details NOW – the course begins in September.

To: Registry *(reference AU)*,
West Glamorgan Institute of Higher Education,
Townhill Road,
Swansea SA2 0UT (Tel.[0792] 203482)

Please send me details of the BEd (Honours) degree in Computer Science and Mathematics

Name ..............................
*(BLOCKS Please)*

Address ..............................

AA159

# EPROMS & RAMS

Hitachi 250nS — the reliable ones — BBC compatible
Prices **INCLUDE** VAT and UK post — normally by return

**2764** 1-2 pcs **£2.35** 3-9 pcs **£2.25** 10+ **£2.15**
**27128** 1-2 pcs **£3.35** 3-9 pcs **£2.95** 10+ **£2.65**
**27256** 1-2 pcs **£6.00** 3-9 pcs **£5.75** 10+ **£5.50**
**27C256** 1-2 pcs **£8.00** 3-9 pcs **£7.75** 10+ **£7.50**
**6264LP15** RAM 2-9 pcs **£3.50** 10+ **£3.00**
**41254/41464** RAM **£8 each. 48416 £2.95 each**
**BB-PROM** Programmer £33.95 inclusive. DFS required.
**ERASERS:** D1 **£21.95**, D2 (15 min timer) **£26.50**

Send UK cheques/Money Orders/ LA. or Gov't Orders to:

**SILICON CITY**
**1 Milton Road, Cambridge CB4 1UY**
**ACCESS/VISA orders, telephone 0223 312453**

AA94A

MICRO FIX

## FAST REPAIRS FOR THE BBC MICRO BY THE ACORN APPROVED SERVICE CENTRE

**191 FRESTON ROAD, LONDON W10 6TH**
**PHONE: 01-968 9214**

- Repair centre for BBC B, B+, Electron, disc drives etc.
- We have been Acorn service specialists for 3 years and are justifiably recognised as experts in this field.
- BBC micro repairs: average cost £15-£20.
- Complete disc drive calibration: £15/drive.
- Upgrades: Disc – £65 inc. installation. Econet – £65 inc. installation.
- Other upgrades carried out as required.
- All repairs fully guaranteed.
- Insured return carriage if required.
- Extended warranties available on most equipment.
- Low prices for Mitsubishi disc drives and Acorn peripherals.
- Acorn authorised Econet support centre. Expert installations and trouble-shooting.
- Express service by prior arranagement.
- Opening hours: Normally Mon-Fri 10am-6pm & Sat 10am-3pm, but phone first.

**RING 01-968 9214 AND ASK FOR MARK DUFFILL OR DEREK MULLINGS**

AA82A

## Problems with the bus?

Our 1MHz bus drivers provide full buffering of the data, address and control lines and also provide 6 bus outlets so that you don't have to keep swapping devices around and no more daisy-chains either, with the result that everything should work better. Also each outlet has a disable switch so that incompatable peripherals can be switched off. For the hobbyist there is our 1MHz bus Breakout box which provides full buffering and allows easy connection to a bead-board for cheaper and quicker development and testing.

*** Also customised ribbon cables available – phone ***

1MHz Bus Driver (6 Outlets) .............. £35.95
1MHz Bus Breakout box .............. £19.95
Add £1.50 for postage & packing.

Please make cheques/postal orders payable to:

**COMPUTECH,**
The Garth, Hampsfell Road,
Grange-over-Sands, Cumbria, LA11 6BG.
*For further details write or phone (04484) 4604.*

AA161

# S P I D E R 2

*REAL-TIME CONTROL FOR THE BBC MICRO*

*Watch the SPIDER!*
- *Powerful new BASIC commands for invoking PROCs from the User Port, Serial Port or the Keyboard.*
- *8 independent countdown timers.*
- *Easy to install with no soldering.*
- *Comprehensive manual supplied.*

*New SPIDER 2 features*
- *Special keywords for controlling the Serial Port.*
- *Professional implementation of Foreground/Background processing.*
- *Reaction timing and pulse trains accurate to 0.1 milliseconds!*

*from £65 including VAT*

*SPIDER 2 is a RAM/ROM combination which uses none of the BBC's memory, so BASIC programs are unaffected. The BBC B+ is fully supported and we supply a complete range of digital, analogue and serial interfaces for use with SPIDER using the 1MHz bus. Ask now for details.*



SPIDER – stamps out I/O bugs

*Paul Fray Ltd*
Willowcroft, Histon Road, Cambridge CB4 3JD
Telephone: (0223) 66529

# COMPUTER SERVICING

(established since 1979)

BRITISH BROADCASTING CORPORATION MASTER SERIES MICROCOMPUTER

WE REPAIR – ON THE PREMISES – QUICK TURNROUND

☆ BBC & ELECTRON
☆ COMMODORE & SPECTRUM
☆ AMSTRAD & TORCH
☆ DISK DRIVES, PRINTERS, MONITORS

**MAIL ORDERS by phone Access and Visa Accepted**
**A Range of Hardware, Software, Joysticks, Leads, Interfaces Chips etc, and Computer Paper always in stock**

**CROYDON COMPUTER CENTRE**
**29 BRIGSTOCK ROAD, THORNTON HEATH, SURREY CR4 7JJ. Tel 01-683 2646**

**THIS NOTICE WORTH £2.50 AGAINST ANY PURCHASE OF HARDWARE OR SOFTWARE OVER £25**

AA90

## BBC/ELECTRON 'IMAGE' V.2

**'IMAGE' was the ultimate tape back-up copier now, it's even better**

You can be completely assured that this is the best and most able program of its type available. It can deal with:

* Locked programs
* Programs of any length
* 300 and 1200 BAUD
* Files
* ?'s (Ctrl codes) in Filename
* Multiple copies
* False or trick block info.
* Changing Filename
* Continuous data streams*
* Locking and unlocking programs

It is VERY IMPORTANT INDEED purchasers take note that **'IMAGE'** is for sale strictly for making **BACK-UPS** of your own software for your own use, for protecting your own programs, or as an aid to putting software on disk. Any person found using the program for illegal purposes runs the risk of being prosecuted.

To receive your copy of 'Image', send a cheque or P.O. for the sum of **An Astounding £4.80.** to:

**Peter Donn, Dept. (AU) 18 Tyrone Road, Thorpe Bay, Essex SS1 3HF**

Please state BBC or Electron version. V.1 owners can obtain V.2 by sending £1.50 + V.1 without case.
*BBC version only

from the absolute sector number by decimal division in Basic. An NMI service data transfer routine will be needed, but all other operations could be performed (rather slowly!) from Basic by using the ? operator. There are many applications for this kind of disc storage, mainly in the field of true random access.

Finally: the only thing you can spoil by poking around the FDC is disc data. You can't really damage your micro or your disc drives by mistakes at machine level, but you mustn't try to seek past the number of real tracks on your drive.

All drives have a springy end stop to allow for the occasional over-seek, but bashing on it will mis-align the drive head. The rule is: if it rattles, hit Break.

## DUMPS ON A DAISYWHEEL

The problem with daisywheel printers is that you can't print graphics. Until now, that is! With the help of this little program (listing 1) from Dave Atherton, your daisywheel printer can produce quite acceptable screen dumps. Daisywheel printers don't have definable graphics so the full stop character is used to produce the dump.

The program works by scanning the screen (or a section of it) using the POINT command and printing a full stop every time a dot is detected. To start with, a screen image is loaded from disc (line 80), although you could create something on screen with some lines of code instead.

The area of the screen to be dumped is set in lines 110-120 and line 130 sets the margin on the paper (in dots, not character spaces). PROCsetprinter programs the printer to do very narrow character spaces, and very short line feeds. These codes are for the Brother/Juki range of printers, but other daisywheels should have similar codes. The setting shown is 1/60″ character space and 1/48″ line feed.

```
10 REM Daisywheel Screen Dump
20 REM for Brother HR15, Juki etc.
30 REM by Dave Atherton
40 REM for BBC/B+/M128/Electron
50 REM (c) Acorn User
60 :
70 MODE4
80 *LOAD Screen FFFF5800
90 :
100 size=1
110 x1=0:y1=0
120 x2=1279:y2=1023
130 margin=20
140 :
150 PROCsetprinter
160 VDU 2
170 FOR Y%=y2 TO y1 STEP -4
180 VDU 1,13
190 FORI%=1 TO margin:VDU1,32:NEXT
200 FOR X%=x1 TO x2 STEP 4
210 dot=POINT(X%,Y%)
220 VDU 1
230 IF dot=1 THEN VDU 46 ELSE VDU 32
240 NEXT X%
250 NEXT Y%
260 VDU3
270 PRINT TAB(0,30)"Dump done":END
280 :
290 DEFPROCsetprinter
300 VDU 2,1,27,1,&1F,1,4*size
310 VDU 1,27,1,&1E,1,2*size,3
320 ENDPROC
```

**Listing 1. Daisywheel screen dump**



**A daisywheel screendump!**

Lines 170 to 250 perform the scan. In the listing, which is designed to run in mode 4, all colours except the background will appear as black. By altering line 230 to, say:

IF P% = 2 OR P% = 4 . . . .

selected colours can be dumped. It's also perfectly possible to run the program in other screen modes.

When using the program, it's good to put a couple of pieces of paper behind the one you are printing on, as the hammering effect of the full stop can easily wear its way through to the printer platen. Also you will probably find that carbon ribbons tend to give a slightly better image, as indeed they do in text printing.

You may find that the image produced is a negative of that required. If this is the case, change the value of 'dot' in line 230 to 0.

## NEW VIEWS ON LIFE

The *View* function keys can be set up to hold whatever strings and commands you wish. To do this enter command mode and type:

*FX228,1

Function keys can then be defined as usual:

*KEY 0 "Acorn User"

Acorn User can then be inserted into your text anywhere you want, just by pressing the CTRL, Shift and function key 0 keys together. For regularly used key definitions, why not include them as part of your !BOOT file? Remember to include *FX228,1 though!

You can prevent a block of text being reformatted by the Format command by inserting a ruler with no right-margin '<' character immediately before it.

When you alter the page format of some text, the format of the first printed page is not always affected.

To make sure this doesn't happen ensure that you don't have any blank lines or text lines before any of the commands. If you do, the computer will print them before executing all the commands, so the commands will not take effect until page two.

Alternatively a separate file called COMMAND can be set up which contains only the command lines. Then on printing type:

PRINT COMMAND TXTFILE

and the COMMAND file will be executed followed by the printing of the textfile, TXTFILE.

You could of course include a variety of commands in various command files and use the one you require before you print your text file. This has the advantage in that you only need to define your commands once.

You can save part of a large document by first setting markers 1 and 2 at the extremes of the text you wish to save. Then enter command mode and type:

WRITE name 1 2

which will save the text between markers 1 and 2 under the filename given by 'name'.

If you omit marker 1 you can save all text up to marker 2; if you miss out marker 2 you'll save all text after marker 1.

You can insert a file into a current document by setting marker 1 at the point you want the file to be inserted, then going into command mode and typing:

READ name 1

The Read command can also be used to load in text SPOOLed form *Wordwise*.

One use of *View*'s 26 number registers (September '85, Wordprocessor Hints and Tips) is to allow you to relate your page numbering to chapters, by setting up registers C and P at the start of each chapter. Type:

SR C¦C+1

SP P 1

Page numbering could then be started by using a command such as:

DF //Page¦C.¦P//

The pages in chapter 2, for example, would now be numbered 2.1, 2.2, 2.3, etc.

When using the Screen command, *View* turns paged mode on, so giving you a page of text at a time.

Paged mode can be turned off with CTRL-O. Pressing CTRL-N will turn it back on.

# Why Pay £2.50 for a FREE Demo Disc?

## What You Get With Your £2.50 Free Disc

**1.** A stunning demonstration of many programs from the Beebugsoft range of software. Hear for yourself how good Studio 8 is. Watch Icon Master and Toolkit Plus at work. See the results of Hershey characters and RomIt. And much more.

**2.** If you decide to purchase any of our programs once you have seen the demonstrations, send us the disc label to receive a discount of £4.00 off the retail price of any one item of software from the latest 20 page full colour Beebugsoft catalogue. Hence the disc is free!

**3.** Also on the disc is a free arcade style machine code game. Blast the monsters with "Grid Runner".

**4.** A special code-breaker program is included on the disc. Issues of Beebug and Acorn User, up to July 1986 will include special code numbers; type these numbers into your code-breaker program to see if you are one of the lucky winners for that month. Each winner will receive the Beebugsoft program of their choice.

**5.** Once you have finished using our Free Disc, you have a top quality disc which you may re-format and use for your own purposes.

You Can't Go Wrong! Just fill in your name and address below and send it to us with £2.50.

Beebugsoft, PO Box 109,
St. Johns Road,
High Wycombe, Bucks.
HP10 8NP

**This month's code-breaker number is D85307**

This offer is limited to one disc per household/institution

Please send me a "free" disc,
I enclose a cheque for £2.50/Please debit my Barclaycard/Access No.

Name

Address

Specify 40 or 80 Track

Send to:
Beebugsoft,
PO Box 109,
High Wycombe,
Bucks., HP10 8NP

# FREE ADS

**SOLIDISK** 128k sideways RAM with disc manual £110. Will sell separately as 32k baseboard £35 and 98k plug in £35. Phone Tony Colombat on 0942 488700 after 6 pm.
**MEMORY** 27128/250 and 6264LP15/150 suitable for ROM boards. The two unused for £6.50. Phone Harrogate 0423 872045.
**DISCS** on the cheap. 100k Tandon drive. £25. Complete with cables and formatting disc. Postage £2. Phone Harrogate 0423 872045 for an economy drive.
**EPROM** programmer chassis complete with disc software and full details. Programs 8k and 16k EPROMs. Complete with two unused 16k EPROMs. Needs 5 volt and 21 volt supplies. £16 ono. Phone Harrogate 0423 872045.
**TRACKERBALL** to suit micro User articles. Atari. Complete with info on converting it into an ordinary mouse. £12.50. Phone Harrogate 0423 872045 and help me to tidy up.
**CHEETAH** speech board as new £12.50. Phone Harrogate 0423 872045.
**ELECTRON** Viewsheet ROM cartridge £12. Unused in original and undamaged package. Phone Harrogate 0423 872045.
**RGB COLOUR** monitor chassis (without case but with isolating transformer) works well with computer. Has to go. £75 ono. Phone Harrogate 0423 872045 to add colour to your life.
**AUSTRALIAN BBC** user searching for contacts to exchange tips info + software. Write to Roger Jolly, PO Box 424, Camberwell, Victoria 3124, Australia.
**WANTED** Microvitec colour monitor in good condition. Medium resolution. Any reasonable price considered. Tel: (0691-81) 259, Oswestry area.
**BBC As** and Bs urgently required by unit supporting severely physically disabled children. Also any disc dives and printers. Please help Cause for Concern, 117 St. Johns Road, Exmouth, Devon EX8 4EH.
**WANTED** Pascal ROM will be prepared to exchange for another ROM or software. Contact Mik, 39 Irving Place, Blackburn, Lancs BB2 6LR.
**OFFERS** 100k Cumana +PSU disc drive. Acorn DFS. Mags: approx 30 copies of, Your Computer, C+UG, PCN. 16k 2×81 RAM pack. Broken 2×81 offers. Phone Godalming 6589.
**WANTED** Solidisk EFS for Electron Plus1. Must be in V.G.C. Pay up to £35 or swap for £250 software including Elite Repton, Overdrive and joystick interface. Write W Reid, 9 Primrose Bank, Wigton, Cumbria.
**BBC B** Acorn DFS OS1.2 plus software plus mags. Price £320. Tel: 01-349 4490 between 6-8 pm.
**PENFRIEND** and programs. Write to Ruud Burgel, Prunusstraat 35 4431DC, S-Gvavenpolder, Holland.
**ELECTRON** with Plus One interface. Excellent condition boxed with leads, user manual, advanced user guide and first 29 issues of Input magazine. Over 75 games including Elite £160. Tel: Lymm (0925 75) 2515.
**WANTED.** Acorn Electron mode seven adaptor by SIR Computers. Will pay all cash, or part cash and various goodies (including Atari 600XL). Tel: (0908) 564249 after 4 pm. Ask for Gary.
**BBC** disc drive 200k. Vgc. Boxed. £70. Printmaster and Graphics ROMs as new £18 each. Tel: (0203) 341529 after 5 pm.
**TEAC 55E** half height SS/DD 40/80 track disc drive cased/cables as new £68. Acorn Basic 1 and V1.2 DFS chips £8. Tel: Paul (0293) 515201 or write 9 Goffs Close, Crawley, Sussex.
**BBC B**, DFS, tape recorder, lots of software on tape and disc, programmable joystick, modem. Also Seikosha printer/plotter GP 700A. Will separate. Sell for £680 ono. Phone 021-550 7085.
**UDM DDFS** for sale. Up to 120 files per disc. Latest 3.1 version with disc sector editor disc. Three months old, as new £70 ono. Phone 091-262 7764 after 5.30 pm.
**MICROVITEC** colour monitor £120, Nightingale and Commstar £75, 6502 2nd processor £110, CGP 115 printer £35, AMX mouse £35. Pembroke (0646) 684961 after 5.30 pm.
**WANTED BBC B** computer in East Lothian. Preferably with disc and Wordwise. Phone evenings or weekends. North Berwick (0620) 3827.
**BBC 1.2OS DFS** very good condition £275. Software, recorder and manuals available. Little used. Tel: (0252) 877085.
**BBC B,** OS 1.2, Watford DFS, Teac 100k drive, cassette recorder, Gremlin, discs, magazines, books, tapes, etc. Excellent condition. Cost £900. Accept £450 ono. Tel: 01-994 7521 (weekdays) or 0604-714886 (weekend).
**2K STATIC** RAMs £2, Kempston joystick £8, Doctor Who game cassette £5, various Spectrum software, Beeb books for sale. Write for full list to Paul Stevenson, 19 Marland Hill Road, Sudden, Rochdale OC11 4PQ.
**WANTED.** Phloopy Drive cartridges. Contact Paul (0954) 211133.
**BLANK DISCS,** mainly Verbatim and 3M £10 per ten. Bigears speech recognition system, leads, and manual. Only £20. Tel: David on Dartford (0322) 29666 after 6 pm.
**GRAPHPAD GRAPHICS** tablet, complete with extensive software, £80 ono. Five inch colour television, no sound, but ideal as a display. Only £25. Tel: David on Dartford (0322) 29666 after 6pm.
**BBC B** 1.2 OS + Solidisk ADFS + dual 100k disc drives. Includes discs, manuals and leads £410 ono. Ring David on Dartford (0322) 29666 after 6pm.
**MUSIC 500,** programmable synthesiser for BBC. Vast range of complex sounds and facilities. No need to be computer programmer or music scholar. Controlled by its own language called Ample. £150. Mike 0297 52566.
**PARFITT** plotter DP025 as new, used rarely. Three colours. £240 ono. Tel: Peterborough 270 875.
**CUMANA** disc drive, CS100 100k, 40 track single sided perfect, boxed. With leads £80. Tel: Ash Green (0474) 873186 north west Kent area.
**BBC B,** Watford DFS interface, 80 track disc drive, ATPL sideways ROM board, B/W monitor + Wordwise, Exmon. £450. Tel: 01-642 1359, evenings only.
**BBC B,** disc drive, DFS, tape recorder, Voltmace joystick, 11 discs, £200 software, 60 magazines, various books — all in best condition – only £430. Might sell separately. Phone Gary on 0329 283589 now.
**AMSTRAD CPC 464** colour computer including Basic 1, games software, user magazines, books, joystick, mint condition, bargain £280. Phone Rochdale 353915, buyer must collect. Wanted Electron software, games and O level; local preferred.
**SOLIDISK** 32k sideways RAM 5 months old. In perfect condition with manual and utilities disc. Cost £59. Sell for £47 ono. Contact Gary. Tel: 021-356 2985.
**WANTED** sideways RAM for BBC B. Phone: Martin on 0302 770522 evenings only.
**GERMAN** Acorn user (model B, discs, 40Tr.) looks for contacts with English users. Please write to Sven Mohr, Grapenberger Straße 92, 3012 Langenhagen, West Germany.
**KENDA** double density DFS Page = &E00. Complete interface. Also 3″ Opus disc drive and ten discs. Offers please WHY. 632 Signal Troop, RA Range, Hebrides Balivanich, Isle of Benbecula, Scotland PA88 5LN.
**BBC** Acorn Prestel adaptor little used for sale or exchange considered for BBC Acorn teletext adaptor plus DFS discs. Phone Chatteris, Cambs (03543) 5595.
**CHEETAH** speech synthesiser for BBC. Excellent condition with demo tape – ideal present – only £17. Also Aquarius computer, data recorder, cartridge, book with all boxes, leads etc. Vgc only £55! Telephone Southend 72193.
**QUICKSHOT 1** joystick brand new. Sell for £8. Ring Ian 0223-880152. For good advice on latest games ring or write to Ian Jones, 40a Pierce Lane, Fulbourn, Cambridge CB1 5DL.
**TORCH** ZEP100 Z80 2nd proc. with perfect sofware £165, Apple II disc drive £40, Miracle WS2000 modem £80, Remex BBC double sided disc drive £55. Ian (0763) 41720.
**PRINTER/**Plotter 4-colour MCP40 with leads to BBC and 380Z, extra pens and paper £70 only. 021-426 5447.
**PRINTER** Brother HR5 very good condition inc. mains power adaptor and Beeb connecting lead £115. Original box. Write to M Bright, 31 Maitland Road, Russells Hall Estate, Dudley, West Midlands DY1 2NU.
**HELP** needed on adventures eg, how to get past the witch in Castle Quest. Will exchange Hints and Tips on most adventures. Tel: 0742-447593, or write to Kashaf, 226 Darnall Road, Sheffield S9 5AN.
**WANTED** quality modem, books on MS-DOS, hacking, IBM PC, Datastar Calstar any IBM type accessories. Contact Dawson 2 Stocks Court, Poulton-Le-Fylde FY6 7TA. Tel: 0253 886545.

**Acorn User has been alerted to the abuse of the free ad service and, regrettably, can no longer accept entries selling or swapping software.**

**BBC (B)** 1.2OS with DFS & Wordwise. Single sided 40/80 switchable ½ height disc drive + 20 discs of s/w £500 the lot or split. Phone Anil 031-229 5953. Wanted: 3½ inch DS (40/80) disc drive.
**WANTED:** Acorn Electron Plus One expansion unit. Will pay around £30. Must be in mint condition. Seller must be around Lancashire, please. Phone Preston (0772) 612627, evenings only. Ask for Michael.
**ACORN** Electron, Acorn recorder, lots of books and mags. and 63 software titles. All in immaculate condition. Tel: Barnsley (0226) 288211 after 4 pm and ask for Neil. All for £140 ono.
**WANTED!** BBC – user/owner penfriends. Any country. Aged 16 – 20. Write to Christopher Perry, 32 Lightwoods Road, Pedmore, Stourbridge, West Midlands, England.
**BBC B** (with Basic II) excellent condition, colour television, joystick, tape recorder, many magazines, books and software from Acornsoft, Imagine, Ultimate, Micro Power and others. Sell for £465 ono. Ring Keith 01-808 8187.
**BBC B** Amcom DFS, Kaga green monitor, Mitsubish 80TK 400k disc drive, Kaga KP810 dot-matrix printer, View, games, books, magazines, +more! Ring for more imformation. Bargain £1050 ono. Bude (0288) 4682. Jonathan.
**MODEM** 1000 and ROM for BBC. Boxed with manual, lead. Hardly used and in full working order. For use with Prestel etc. £40 ono. Phone Chester (0244) 378411 or Prestel Mailbox 01-999 6035.
**MICROVITEC** 1431 colour monitor standard resolution. Very good condition. Original packaging £95. Phone Slough 681197. Ask for Jas (evenings).
**TEAC** dual 100k half height drives. Complete with leads, manual, and utilities disc. A bargain at £125. Tel: David on Dartford (0322) 29666 after 6 pm.
**40 TRACK** 100k SS drive – £90 ono. BBC Software F/S includes Elite, Crazy Painter (tapes) – many others – Phone Mark on (0703) 845371 after 5pm.
**POCKET COMPUTER** for sale. Sharp PC-1245 + 200 page manual. As new. Still in original boxing. Hope to sell for £27 ono. Please tel: Weston-super-Mare 419765.

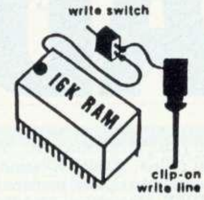
**We've changed the format of the Free Ads so that we can clear the backlog and no longer have to carry ads over from one issue to the next. The Free Ads are carried in the magazine as space permits, so please allow about three months for yours to appear.**

## FREE PERSONAL AD SERVICE

**Sell your old hardware or pass on information. Fill in the form below to a maximum of 32 words (one in each box) and send it to Acorn User Free Ads, 141-143 Drury Lane, London WC2B 5TF. Please use capital letters, write clearly, and remember your name, address or telephone number. Without this full information, supplied on a separate sheet of paper, we regret that we cannot carry your Free Ad. This is a service to readers – no companies please. One entry per form only, and we cannot guarantee any issue.**

| | | | |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

# 16K & 32K RAM modules




- For use with the standard BBC model 'B' fitted with **TAPE, DISC** or **NETWORK** filing systems.
- Plugs into any one of the BBC's four sideways ROM sockets. 32K occupies two sockets.
- Write switch fits neatly to rear of BBC case.
- No soldering. Step by step instructions.
- Small size L. 35 W. 18 H. 14mm, fully encased.
- Module uses low power static c-mos RAM.
- Software supplied on tape/disc 40 or 80 Track is compatible with BASIC I/II & NETWORK systems.
- Menu driven software options include:
- (L) LOAD RAM Loads ROM data from tape/disc
- (S) SAVE ROM Saves ROM data to tape/disc
- (P) PROTECT Protect ROM image data
- (V) VIEW ROMS Displays titles & sockets
- ( * ) OS COMMAND *CAT etc. . .
- (Q) QUIT Exits program

**16K £22**
**32K £35**
Please state: disc/cass

FREE P&P. Send Cheques/PO to: **C.F. Terrell**
**7B Essex Gardens, Hornchurch**
**Essex RM11 3EH. Tel: (04024) 71426**

**EDUCATIONAL DISCOUNTS**

AA152

# WEATHERMAP – FORECAST ENGLAND AND WALES

A program giving a weather forecast and graphic weathermap for England and Wales.
Uses local data eg, Barometer readings, Wind details etc.
Weather reports can be added and displayed for comparison.
Forecast and report records can be kept as data files, each file holding up to one month's records.
The reports on file can also be displayed in a Graph and histogram format, showing the weather pattern, plus totals/averages, over a 31 record period, on one screen display.
A useful program for keeping local weather records, amateur weather forecasting and in education.

For BBC(B). Cassette only. **Price £7.50 incl. P/P.**

Send Cheque/PO to:

**MICROMET**
**25 JUNCTION ROAD, LEEK, STAFFS ST13 5QL**

# MATHS MARVELS

The graphics and speed of the BBC micro turns mathematical imagination into reality.
Fractals – including the Mandelbröt Set, Penrose Tiles, Fourier Series, Conway's Life – 256 × 256 at 0.1 to 2 seconds a generation, and a moving 4D cube with hyperspheres at each corner.
On disc only, state 40 or 80 tracks.
Not for Electron. Send £6 Cheque/PO to:

**DAVID McQUILLAN**
**12 Keldholme,**
**Wildridings,**
**Bracknell, Berks RG12 4RP**

# S. P. ELECTRONICS

ALL IN STOCK — BBC SPECIALISTS

| | |
|---|---|
| BBC MASTER 128 | £499.00 |
| BBC B + (64K) | £469.00 |
| CUMANA CD800S (800k) 2x80 track DS drive with PSU | £255 |
| CUMANA CDX800S (800K) 2x80 track DS drive without PSU | £209 |
| CPA 80 Printer (inc. cable) | £199.00 |
| Disc Operating System | £96.00 |
| Disc Drives | from £85.00 |
| G3 WHO RTTY PROGRAM (TAPE) | £7.50 |
| G3 WHO RTTY PROGRAM (EPROM VERSION) | £20.00 |
| Circuit board for RTTY decoder Mk3 (inc. instructions) | £7.00 |
| CANNON Dot Matrix 160cps NLO | £299.00 |
| Joysticks (pair) self centring + analogue | from £17.95 |
| Printer Cable (Centronics) | £12.90 |
| Speech Synthesis | £55.00 |
| Disc Doctor | £33.00 |
| WORDWISE Word Processor | £39.00 |
| Slow Scan TV Circuit Board + Program (inc instructions) | £17.50 |
| ADFS | P.O.A. |

*Wide selection of software, books, leads, plugs, etc. SAE for full list. All available Mail Order*

*All prices only while stocks last.*

**48 Linby Road, Hunckmall,**
**Notts. NG15 7TS**
**Tel: 0602 640377**

(all prices include VAT)

*Carriage extra*

AA114A

# ACORN USER ADVERTISEMENT PAGES – MAY ISSUE



# ★ EPROM PROGRAMMER ★

- ★ Programs 8K (2764) and 16K EPROMs
- ★ Powerful menu-driven software supplied on ROM
- ★ Supplied cased, with high quality zero insertion force socket
- ★ Very easy to use
- ★ Comprehensive manual included
- ★ Now available ex-stock

Introductory Price £36.50

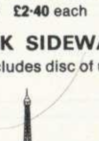
## FAST PROGRAMMING BOARD

(Programming times for 16K ROMs as low as 28 seconds!): **£9·25**
We also supply blank EPROMs (250 nS)

8K **£2·40** each 16K **£2·85** each Quantity discount available

## 16K SIDEWAYS RAM PACK: £26.85

Includes disc of utilities for printer buffer, ROM Filing System formatter etc.



All prices include VAT. Please add 60p postage and packing on all orders under £5·00.
Ring 0752 787058 for further information, or send cash with order to:

**IFEL (Interface Electronics & Computing)**
**36 Upland Drive**
**Derriford**
**Plymouth PL6 6BD**

# SMALL ADS

■ **Centronics 739** printer ROM dumps colours, shaded, *command, printer control, Wordwise fkeyset, manual, utilities (tape/disc) £25. Electrocomp, 5 Polden Close, Farnborough, GU14 9HN. (0252) 510486.

■ **AC Circuit Analysis.** New program, menu driven, 30 nodes, transformers, frequency sweeps, pulse response, alternative values, £60. Details from Markie Enterprises, 17 Percy Road, Shepherds Bush, London W12 9PX.

■ **Problems?** R-SOFT utilities can help you! **1. How-to:** An essential collection of software and instructions for frustrated new disc owners who want to move their programs to disc. **2. Nutcrackers:** tape2tape + tape2disc + disc2disc + disc2tape. **3. Rompull** and **Tapedump. 4. Automatic Disc Menu:** Includes a sideways RAM version, can boot from ROM, works with 2nd 6502. **5. Autosol:** Will automatically boot your Solidisk with a preselected list of ROMs. **6. SWROM*:** puts your Basic/machine code programs in ROM format. **7. RFS-Generator:** Generates ROMs for the *ROM filing system. This does not use DFS workspace and is an ideal tool to run nasty programs from disc. All above packages £5 each; **How To + Nutcrackers:** £9. **D-Master:** Superb disc copier (is unprotected): £7. Many other utilities: Send for our list (SAE please). R-SOFT, 22 Marriotts Close, Felmersham, Bedford MK43 7HD. Tel: (0234) 781730.

■ **Triple** contains Twin to back-up valuable protected discs, Digger to display format information and contents of all readable tracks (and alter it if desired), and Dual to create your own 40/80 track discs. £10. Twin alone, £7. John Connett, Dene Croft, Westcott Street, Westcott, Dorking, Surrey RH4 3NY.

■ **Speech-Aid** 1000 words ready to speak plus invaluble speech creation utility. A must for all users of Cheetah's Sweet Talker. Disc only, send cheque/postal order for £5 to M Randall, 5 Redwood Close, Irchester, Northants NN9 7BX or sae for details (state 40/80t).

■ **Dust covers** for BBC A, B & B+ and Electron. Can still be fitted with Plus 1 & 3 attachments. Just send £2.99, stating computer. Allen Enterprises, Freepost, Luton LU2 8BR.

■ **Sideways RAM** 16k for BBC. Easy to fit, no soldering. Utilities software included. £22 inc p&p. RJR Electronics, 37 Heworth Green, York YO3 7SX.

■ **BBC B 1.2OS,** Cumana disc drive, Wordwise+, Brom, joysticks, all boxed, good condition, lots of software, only £590. Tel: Tonbridge 366966.

■ **Exam preparation;** 200+ question data banks: computers, chemistry, physics. BBC discs £13.50 each. Special Econet versions £27.50 each. BBS, 4 Chaomans, Letchworth, Herts SG6 3UB.

■ **EPROM** erasing and programming service. Very low cost. Also, Basic programs entered onto EPROM. EPROM available with CALCULATOR and METRIC CONVERTER programs for BBC B. Send SAE for details. Contact A Smith, 11 St. Clement's Close, Ardsley, Barnsley, South Yorkshire S71 5DD.

■ **Disc drive** Mitsubishi double sided £95. Also steel plinth, beige, £100. Phone 01-286 0489.

■ **Probability** for O and A level. 15 different experiments and demonstrations, plus objective tests and good graphics. Disc £12, tape £10. Sae for details to K Deadman, 16 Berkeley Drive, Kingswinford, W Midlands DY6 9DX.

■ **Gemini** integrated accounting system. Purchase ledger, stock control, invoicing and sales ledger, nominal ledger complete on 3"discs, £250. King, 4 Hillbrooke Rise, Ilkley, W Yorks. Tel: (0943) 601069.

■ **Ramfile:** The simple, fast database. 14k of records in memory. Saves/appends textfiles for wordprocessing. 40 or 80 track disc £12.50. Romfile (RFS) version £15. Archmac Software, 19 Loskin Drive, Glasgow G22.

■ **BBC B** plus Opus DDOS and 800k 5¼ inch drive, Acorn datarecorder, joystick and £200+ of books, software and discs; all for £430. Tel: Burnham-on-Sea, Somerset.Tel: (0278) 785340.

■ **Utilities** Formatter, verifier, Basic search and replace from only £2. Key strips printed, very flexible layout, also special *Elite* key strips only 30p. Send a 17p stamp for information and example key strip to Crabb Progs, Shrublands, Sherstock, Shaftesbury, Dorset SP7 9PT.

■ **Convert** your 80t drive to 40/80 switchable. MK II unit (cased) simply plugs in, £18. MK I kit – as above but requires soldering iron – fits inside drive, £10. PSU for 2 disc drives, top quality, complete with plugs & leads, £37. All prices include p&p. Magus Electronics, 33 Pool Lane, Winterley, Sandbach, Cheshire CW11 0RZ. Tel: (0270) 582748.

■ **BBC model B** OS1.2, Acorn DFS, manuals, magazines £250. Ramamp 32k sideways RAM/ROM with write-protect switches. Cost £59, accept £25. Durham (0385) 711236.

■ **Variable mains** power controller, up to 1kw. Completely optionally isolated and program-controlled from your user port. Made from inexpensive and easy-to-get parts. Circuit and constructional details £3.50 or sae for ready built units. P Robinson, 168 Firwood Avenue, Urmston, Manchester M31 1PN.

■ **Software** real-time clock, 9 new functions plus full documentation. Sideways ROM only £9.95. Why pay £30+? R Milsom, 21 Bishops Avenue, Worcester WR3 8XA.

■ **For sale BBC** micro plus monitor, Cumana disc drive, Ferguson computer recorder, Centronic GLP printer. All brand new. Various extras, package price. Phone: 01-828 0057.

■ **Walters WM2000** printer £150. Solidisk 32k SW RAM £35. R Hermon, International School of London, Crowndale Road, NW1 1TR.

■ **BBC B** 1.2OS: 200k double disc drive plus DFS. ROMs: Datagem, Wordwise, ViewSheet plus cashbook accounts and payroll. £250 ono. 105 Conway Road, Colwyn Bay, Clwyd. Tel: (0492) 49272.

**We must remind advertisers that we cannot carry advertisements which incite readers to break the protection and therefore copyright of commercial software**

■ **Acorn Z80** second processor, complete with manuals and software. Hardly used, excellent condition, £290. Tel: Barnsley (0226) 283100 after 5pm.

■ **Daisywheel** printer, Quen Data, letter quality, three months old, as new, leads & cover. Cost £300, sell for £200. 31 Howard Road, Newbury, Berkshire RG14 7QD. Tel: (0635) 45654.

■ **Two new** games for BBC B or Electron. 'Whist' and 'Dominoes'. Both games for £5 (tape), £7 (disc). C E Rowbottom, 12 Olive Close, Aston, Sheffield S31 0RR.

■ **Heat load** calculation program for the refrigeration industry. Calculate your loadings in under two minutes. Details: Robert Coomber, 2 Newton Avenue, Tonbridge TN10 4RP. Tel: (0732) 359984.

■ **BBC Z80** second processor, complete software and manuals. As new. Cost £346, will accept £250 ono. Bray, Tel: 01-219 4000 (day) or 01-582 7139 (evenings and weekends).

■ **BBC B,** dual Teac d/s drives, Torchcard, Philips monitor, Prism modem, lightpen, paddles, Perfect software plus other programs, £600 + VAT. Will not split. Phone Jenner, Winchester 63165.

■ **Basic Editor,** Machine code utility provides fast editing of Basic. Supplied on 40 track disc. PO/cheque £5 inc or sae for details: J Smith, 1 The Gardens, Stotfold, Hitchin, Herts.

■ **View 2.1,** ROM plus ISO Pascal £30. ATPL keyboard with Acorn M500 £120. Tel: IOW (0983) 406703, evenings and weekends.

## SMALL AD SERVICE

Please include your cheque for £11.50 (inc. VAT) made payable to Redwood Publishing. This is the standard fee. Don't forget your name, address or phone number. Send cheque plus form to Acorn User Small Ads, 141-143 Drury Lane, London WC2B 5TF. Please print clearly.

| | | | |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

# ACORN USER'S

## DIARY

## Disabled by shy Hermann

Some people aspire to fame and notoriety, others have it thrust upon them. Two in the latter category are Messrs Hermann Hauser and Chris Curry.

A more shy and retiring pair would be difficult to find, and yet their names crop up everywhere.

One of the latest cropping-ups is in the Morley Teletext Adaptor ROM, as pointed out by reader Brian Sharrocks. The command to disable the chip is *HERMANN, and, so we are reliably informed, there is a Kid Curry in there somewhere too!

## Communicating with the kid

On the subject of the Kid, it's getting a bit difficult to work out how *grata* a *persona* he is at Acorn. Since snaffling all the Communicator team from Cherry Hinton (a big leak from the Waterworks?), Mr Curry has had cause to install an Econet at his baronial Croxton Hall mansion.

And where did he go? Why, SJ Research of course!



MURDOCHSOFT

EX-FLEET STREET

A LONG WAY AWAY IN E1

Editor

The special Murdochsoft ROM is highly protected and brings you these exciting new options

| | |
|---|---|
| *DUMP | Gets rid of all those unwanted journalists |
| *BIRD | Supports dual density twin floppies |
| *RAMBLE ON | Switches on Bernard Levin |
| *£ ON | Prints out pound notes |

What's in it for me ? A quick look round

ADMINISTRATION
This is where you store the names of all the people you want to sack and all the TV stations you want to buy.

THE NEW OFFICES
Will not clash with opening hours as a special 'No Wine Bar' option ensures normal working even after 1100 hours.

Welcome to the new exciting world of publishing !

EX-FLEET ST EDITOR

gives you everything you need to produce a professional looking newspaper. No messy machinery, no adjacent wine bars, no cumbersome union agreements, no awkward journalists, just you and your own insatiable lust for power!

"It's absloulutely the bestt packagge I*ve ever used for produicing a newspaper. Totally professional results and noone of that messytypesetting or odd bits of text running of the edge of

Rupert Murderch- The TImES

EX-FLEET STREET EDITOR uses the unique EL VIN.OS operating system.

Automatic regurgitation of Conservative party propaganda.

Replaces word 'large' in all copies of SUN with the word 'Whopping'

Ignores any previous agreement with union managements.

What you will need.

So you want to be a newspaper owner? All you need is about fifty million quid,no qualms and a lot of nerve. SEND NOW!

## Front page news

What do you think of our 'Murdochsoft' page in a *Fleet Street Editor* style? Sent in by someone who wanted to remain anonymous, it was done on *Pagemaker* with a mouse.

## Astronomic bang

One launch which went with a bang recently was Cumana's Astron card. The assembled scribes were having their individual cards (blown on a BBC micro) read and dumped to an Epson printer through an intelligent black box when a bulb fell from a chandelier at the Gloucester Hotel. Bang! The bulb hit the (luckily thick) carpet, narrowly missing an assembled group, and a whole section of lighting was plunged into darkness.

The Swedish government apparently asked for a quote for eight million cards, which, Don Bolton pointed out, is about the population of the country! 1984 might be late, but it's still coming.

## Ultimate answers

Ringing round to try to sort out software compatibility is an arduous task at the best of times, but some companies act plain stupid. Take Ultimate for example.

Their response on *Nightshade*, a great game and a big seller, went like this:

Electron, 'no'; B+, 'possibly, but no guarantee'; Master, 'never heard of it.'

Come on lads, play the game.

# If you think the front looks good – you should see the back.




Once again Mushroom has answered a special need of all BBC computer users with their new WORKSTATION — no more untidy wiring, no more pulled plugs, transforms your system into a handsome console unit.

Features include:—

* ADVANCED CABLE MANAGEMENT
* TWIN 400K MITSUBISHI SLIM LINE DRIVES SWITCHABLE FROM 40 TO 80 TRACK WITH STATUS INDICATOR LED'S
* ON BOARD REGULATED 4 AMP POWER SUPPLY WITH OVERLOAD PROTECTION
* MAINS INPUT FILTER FOR CLEAN POWER SUPPLY
* FILTERED POWER TO THE 3 TAKE-OFF SOCKETS AT REAR FOR MICRO, MONITOR AND PRINTER

The WORKSTATION is manufactured to the highest safety specifications from lightweight aluminium attractively finished in oatmeal with orange trim. When not in use the computer is stored underneath, affording useful protection from accidental knocks or spillage.

**Mushroom**
COMPUTERS LIMITED



The WORKSTATION, complete with twin disc drives, is suitable for all. Areas of use — Domestic, Schools, Local Authorities, Commercial and Industrial.

**This is a must for every user at only £299 Excl. VAT.**

Those people already owning disc drives can have them fitted into the WORKSTATION. Prices on request.

Available direct from:
Mushroom Electronics, 55 Tavistock Street, Bedford, MK40 2RF
Telephone: (0234) 58303. Telex: 826112 MUSCOM G, and selected computer dealers nationwide.




KEYBOARD

JOYSTICKS

ELECTRON

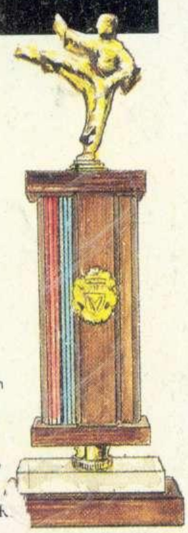
BBC MICRO

Set in the realm of the mystic Orient, Karate Combat pairs you, in thrillingly realistic battle, against 16 of the mightiest and most skilful exponents of "open-hand" fighting. Each opponent has different fighting characteristics and you must cunningly use different techniques to tackle each adversary. Your aim is to move up the rankings and eventually do battle against the 16th opponent, the ultimate challenge — The Master! In addition to the competition mode, the program includes a 2-player mode and a practice mode, complete with a punch-bag, to enable you to master your repertoire of punches, kicks, blocks, spins, sweeps and the spectacular flying kicks.

**PRICE: £8.95 (cassette), £11.95 (BBC disc)**

## COMPETITION COMPETITION COMPETITION COMPETITION

**COMPETITION** — If you defeat The Master you can enter our competition with a chance of winning an impressive trophy (pictured on the right) and the cash prize of **£100.** Closing Date: 30th September, 1986.



**SUPERIOR SOFTWARE** Limited

Dept. AU4, Regent House, Skinner Lane, Leeds 7. Tel: 0532 459453.

Access VISA

**OUR GUARANTEE**

- All mail orders are despatched within 24 hours by first-class post.
- Postage and packing is free.
- Faulty cassettes and discs will be replaced immediately.

**WE PAY TOP ROYALTIES FOR HIGH QUALITY SOFTWARE**